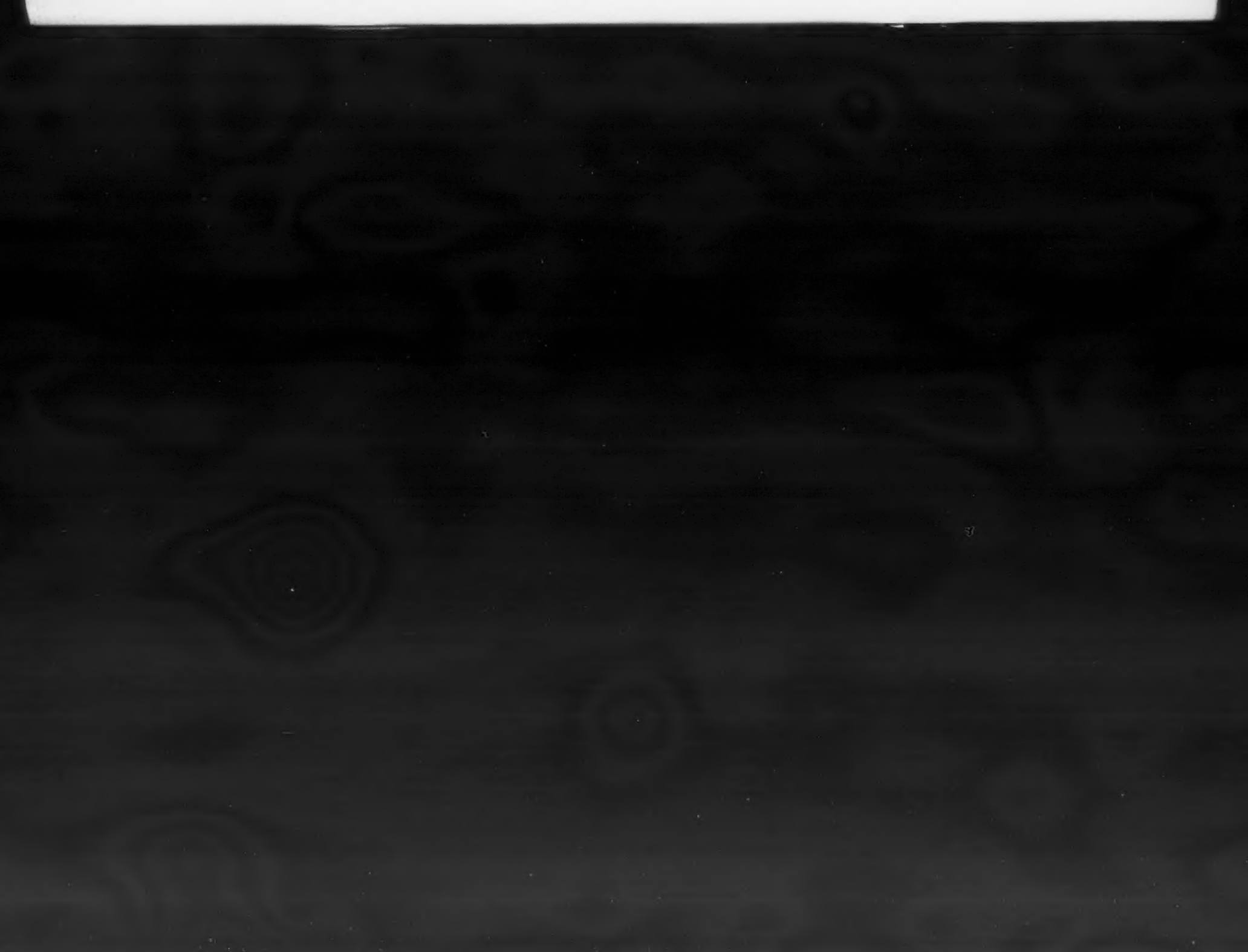
The Humble Way

MAY-JUNE, 1959

Early Texas Oil Field — *Bob Wygant*

Early discoveries, such as this one at Spur Lake in 1902, were spectacular but wasteful. Modern wells are brought in under full control. See "Texas and Oil" in this issue.



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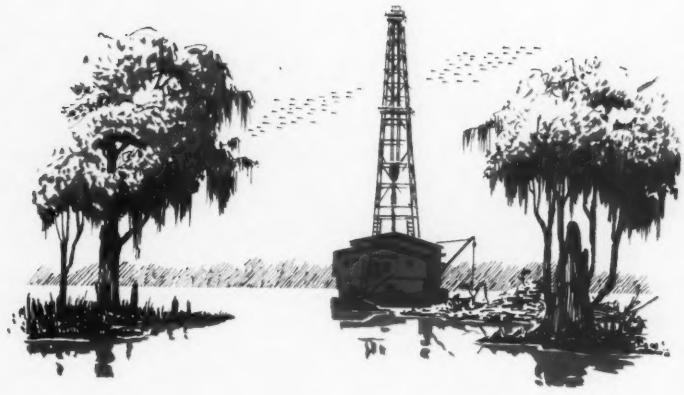


The Annual Shareholders' Meeting

First quarter earnings show improvement over last year, but President Davis emphasizes need for cost reduction

THE BRIGHTER outlook for domestic oil demand and operations should enable Humble Oil & Refining Company to realize an improvement in its 1959 earnings, President Morgan J. Davis said at the Company's 42nd annual shareholders' meeting on May 11.

He added, however, that the extent of an increase in earnings over last year's depressed level will largely depend on the relative movement of costs and prices.

"It will probably continue to be difficult," Mr. Davis told the shareholders, "for petroleum prices to keep pace with other prices, with the result that profit margins may well decrease per unit unless strenuous efforts are made to reduce costs."

Reviewing the developments of last year, Mr. Davis pointed out that many of the problems that affected the industry during 1957 continued into 1958. The major factor was the decrease in demand that resulted from the decline in exports after the Suez Canal was reopened. This decline more than offset the small gain in domestic consumption. During 1958, the industry also had to curtail operations sharply in order to reduce the unnecessary additions to inventories made in the latter part of 1957. Finally, domestic operations had to be adjusted for a continued increase in imports.

The result of all of these factors was that crude oil production had to be reduced by about 6 per cent, with the main burden falling on Texas. In Texas, production was curtailed 12 per cent, but the impact was even greater on prorated wells because exempt production continued to absorb an increasing proportion of the market. Under these various pressures, crude oil prices continued to drift downward and exploration and drilling dropped to the lowest levels in about five years.

A general economic recovery, however, began around the middle of 1958. Domestic petroleum demand and operations also moved upward, particularly in the fourth quarter after the inventory adjustment had been largely completed.

Humble's production, being largely concentrated in prorated fields in Texas, was particularly hard hit by the developments in 1958. The Company's net crude oil production decreased 16.4 per cent, considerably more than the industry average even in Texas. This caused a substantial drop in net income. Efforts to reduce costs were intensified, and by the end of the year the number of employees had been reduced about 10 per cent to a level more nearly in line with the current and prospective rate of operations.

Only 557 company-operated wells were drilled in 1958, compared to 867 wells in 1957. Capital expenditures were reduced sharply from $235 million in 1957 to $155 million in 1958. As a result of this reduction, the Company's working capital position improved and reached more comfortable levels by the year-end.

Humble's net income declined to $137 million for the year 1958, or $1.89 per share, compared with $2.45 a share in 1957.

There were some favorable developments during 1958. The most important of these was a substantial addition to gas reserves. Moreover, the

Company's sales of natural gas continued to increase rapidly, and revenue from gas has also benefitted from improved average realization. The Company still does not know what effect regulation by the Federal Power Commission will have on that part of its receipts from interstate sales which are being collected under bond due to suspension of price increases called for by its contracts. It is believed, however, that all of Humble's contract prices are reasonable, and it is hoped that the ultimate result of investigation of the Company's rates will be to uphold them.

THE results of Humble's exploratory work were reasonably encouraging in 1958 despite a reduced rate of drilling. In addition to substantial increases in our gas reserves, more than enough oil was found to offset production. The North Alazan discovery made late in 1958 continued to show promise of being a major field with substantial reserves of both oil and gas. The Company now has nine wells completed to different sands in this field, and the known area of production already covers some 5,000 acres. In California, a wildcat well in the offshore extension of the Ventura basin, in which the Company has a half interest, indicates a good oil discovery.

As for 1959, the exploration outlook to date is a promising one. Humble has acquired some highly prospective, and rather expensive, state acreage in Louisiana, both onshore and offshore. This will be tested promptly. During the first four months of the year, Humble completed 16 new field or "rank" wildcats, resulting in the discovery of two gas fields. During the same period, the company drilled 11 field wildcats, of which three resulted in the discovery of new oil reserves and two resulted in the discovery of new gas reserves, for a success rate of 45 per cent. In the same period of 1958 the Company completed 16 wildcats, four of which were successful, and 12 field wildcats, eight of which were successful. Judging by the quality of prospects yet to be drilled, it is believed that 1959 will see further significant additions to reserves of both oil and gas. Unfortunately, the Company's Alaska wildcat proved to be dry and has been abandoned, at a total depth of 14,374 feet. This is the deepest test so far drilled in the new state.

The Company's first quarter results (see accompanying box) show a considerable improvement over a year ago. Net income for the first quarter of 1959 was up 36 per cent over the like year ago period. Earnings for the first three months, including a non-recurring capital gain of $2,500,000 were $44,032,000, or 61 cents a share. This compares with earnings of $32,300,000, or 45 cents a share during the first quarter of 1958.

Humble's production for the remainder of the year may continue close to the average rate for the first quarter, but refinery operations will be reduced during the summer months. The increase of 5 per cent in rates of pay that became effective in January and the general rise in costs of other services and of materials will continue to exert upward pressure on costs. Crude price weakness is still being noted in some areas and growing inventories of products may influence further price reductions. It is, therefore, doubtful that the first quarter rate of earnings from operations can be maintained throughout the year. An improvement in earnings over those of 1958 should be realized, however, and the Company hopes to achieve an increase in the rate of return on shareholders' investment from the depressed level of 1958.

CAPITAL expenditures were about $55 million in the first quarter. The large outlays on the 30-inch gas line from Southwest Texas to the Houston area and on the large new gas processing plant on the King Ranch will operate to increase capital expenditures this year to at least $190 million. The gas line will be completed this year, and the processing plant should be in operation by the middle of 1960. If additional drilling becomes financially attractive later in the year, capital outlays might exceed current estimates of capital needs. Humble expects to maintain its working capital relatively constant, however, and to generate sufficient funds from operations to finance the probable outlays.

Freeport Sulphur Company is well under way with construction of the plant to mine sulphur from Humble's Grand Isle sulphur discovery in the Louisiana offshore area. The plant is expected to begin operation sometime in 1960 under a profit-sharing arrangement between the two companies. The contract for this development calls for Freeport to build the plant and handle all operations. The receipts from this project will not be large relative to the Company's oil income, but they should amount to a substantial sum over the life of the plant in view of the large reserves of sulphur that have been indicated by core drill tests.

The President has recently issued an order providing for mandatory control over imports of crude oil and all oil products. There are a number of disturbing aspects to this regulation, including the discriminatory formula for allocation of quotas, but the failure of the voluntary program demonstrated that either some form of compulsory

FIRST QUARTER OPERATIONS—1959

	1st Quarter 1959	Increase Over 1st Quarter, 1958	
		Actual	Per Cent
Net income (after taxes) ($000)	44,032*	11,774	36.5
Net income per share ($)	.61	.16	35.6
Texas producing days	35	3	9.4
Net crude and condensate production including natural gas liquids (B/D)	373,200	36,200	10.7
Natural Gas sales (MMcf/D)	1,381.7	103.9	8.1
Crude Oil refined (000B/D)	290.8	87.8	43.3
Trunk line deliveries (000B/D)	675.3	80.0	13.4
Gasoline sales (M gals.)	152,026	6,454	4.4
Wells completed by Humble:			
Producers	94	—21	—18.3
Dry Holes	31	—	—
Total	125	—21	—14.4

*Includes about $2.5 million from the disposition of a capital asset.

regulation or a restrictive tariff was required.

"This order was issued," Mr. Davis said, "because the President's Cabinet Committee concluded that imports were depressing domestic exploration and drilling and adversely affecting the development of domestic reserves considered essential for national defense.

"Modifications to improve some of the objectionable features such as the allocation formula would be desirable, but it is to be hoped that changes now being made or contemplated will not undermine the basic objective of maintaining a healthy domestic industry, or create uncertainty as to the relationship between domestic production and imports in supplying national requirements."

The new order will leave the average level of imports in 1959 at about the record level reached in 1958, so that its main benefit will be largely in checking the continued rapid rise in imports that would otherwise take place.

Turning to the prospects for the future, it seems that the improvement now under way in the general economy and in the petroleum industry in terms of volume of operations should continue for the next year or more. The trend in profits will be materially influenced, however, by the relative movement of costs and prices. It will probably continue to be difficult for petroleum prices to keep pace with other prices, with the result that profit margins per unit may well decrease unless strenuous efforts are made to reduce costs. It is to be hoped that the industry will continue to use its research and technology to the best advantage by continuously improving the various measures for reducing costs with the result that the rate of return on investments will rise. This will be the goal of the Humble organization.

HUMBLE'S position is sound and strong in terms of reserves, capital facilities, trained personnel, and working capital. Management is confident, therefore, that Humble should be able to make a good competitive showing in the years ahead. The task will not be easy, but with the effective help of all employees and the continued support of our shareholders, Humble should be able to cope with its problems effectively as they arise.

At the annual meeting, which was presided over by Executive Vice President C. E. Reistle, Jr., the shareholders reelected all present members of the Board of Directors. They are Morgan J. Davis, C. E. Reistle, Jr., H. W. Ferguson, Ralph J. Schilthuis, Richard J. Gonzalez, Herman P. Pressler, Ray H. Horton, Ed. J. Hamner, Nelson Jones, and James H. Galloway.

At the Board of Directors' meeting, immediately following the shareholders' meeting, Ray H. Horton, a director since 1955, was elected a vice president of the Company. The directors also elected other officers as follows:

Morgan J. Davis, President; C. E. Reistle, Jr., Executive Vice President; H. W. Ferguson, Vice President; Ralph J. Schilthuis, Vice President; Ray H. Horton, Vice President; Richard J. Gonzalez, Treasurer; Nelson Jones, General Counsel; O. L. Luper, Controller; Paul Millsapps, Secretary and Assistant Treasurer; Carl Illig, Associate General Counsel; Dick H. Gregg, Associate General Counsel and Assistant Secretary; Dillard W. Baker, General Attorney; E. E. Hunter, Assistant Controller; W. J. Crawford, Assistant Controller; T. C. Brunson, Assistant Treasurer and Assistant Secretary; I. D. Breedlove, Assistant Treasurer and Assistant Secretary; L. W. Groce, Assistant Treasurer and Assistant Secretary; Margaret W. Hatch, Assistant Secretary; Elizabeth H. Kenney, Assistant Secretary; Paul G. Norris, Assistant Secretary; O. E. Roesler, Cashier; J. F. Patten, Assistant Cashier; D. P. Fraser, Assistant Cashier; W. E. Sharpe, Assistant Cashier.

A NEW VICE PRESIDENT

RAY H. HORTON, Humble's newly elected vice president, was born in Denison, Texas, attended high school in Ardmore, Oklahoma, and graduated from the University of Oklahoma in 1930 with a B.S. degree in geology.

After joining Humble in 1930, he worked on various field jobs in the Production Department until he was promoted to rotary driller. At the inception of the Industrial Representation Plan in 1932 in the Production Department, he served as Chairman of the Employees' Representative Council and continued in this capacity until he was made safety engineer for Humble's operations in the Gulf Coast Division. He was transferred to the East Texas Division as regional industrial relations manager in 1935.

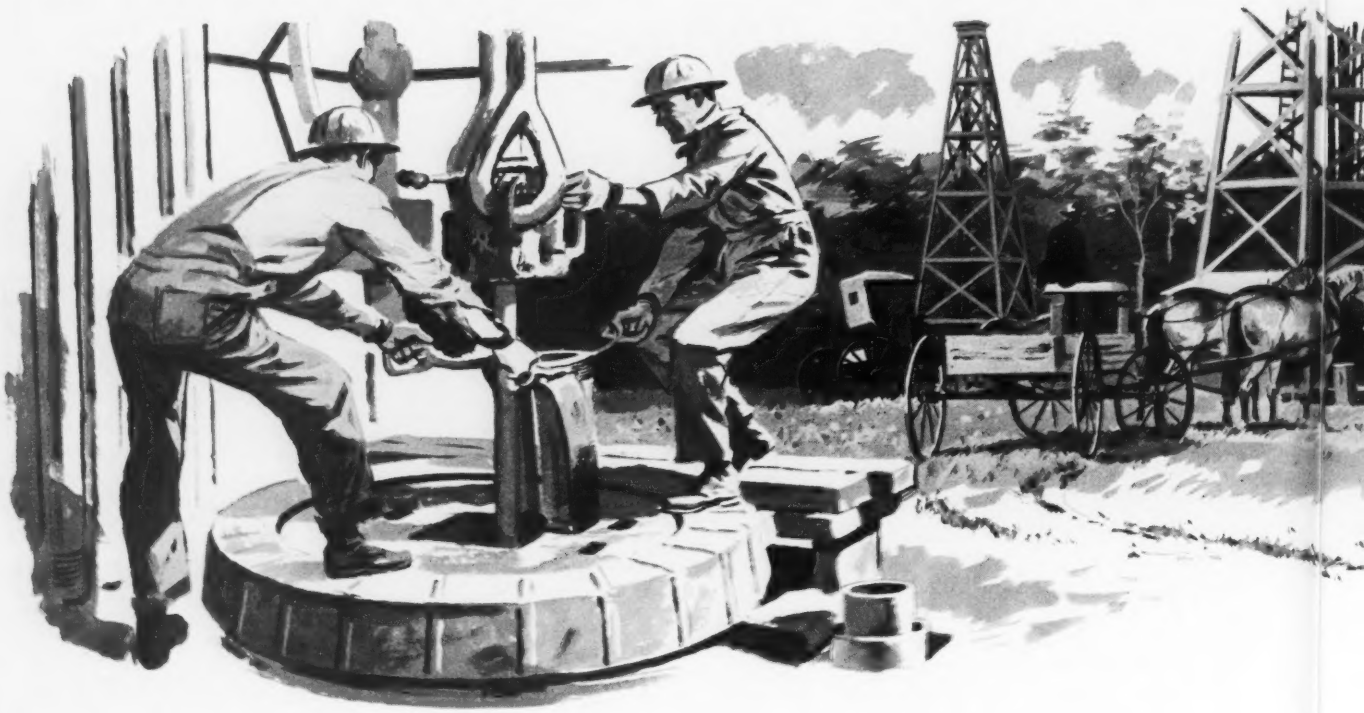
In 1945, he transferred to the Houston Office as policy coordinator for the Production Department. He was appointed Industrial Relations Manager in 1946 and served in that capacity until 1955. During World War II, he served as chairman of the Production Manpower Committee for District III of the Petroleum Administration for War.

Mr. Horton was elected to the Board of Directors in 1955, and has been serving as director in charge of Employee Relations, Purchasing, and General Services. As a vice president, he will continue to be in charge of those phases of Humble's activities and in addition will be the contact director for Humble Pipe Line Company. The latter had been a responsibility of Director Herman P. Pressler since 1955.

Ray H. Horton

This realignment in executive responsibility is necessary, President Morgan J. Davis explained, because of the increasing demands made upon Mr. Pressler in the fields of public, governmental, and industry relations. Mr. Pressler continues as director in charge of the Crude Oil, Public Relations and Advertising, Traffic, and Marine Departments.

TEXAS AND OIL...



ONE HUNDRED years ago the U. S. petroleum industry was born. On the afternoon of Saturday, August 27, 1859, the drilling bit on the Edwin L. Drake well near Titusville, Pennsylvania, slipped into a crevice 69½ feet underground. When the crew returned the next day, they found oil floating under the derrick.

To observe the centennial of this first strike in a well drilled specifically to find oil in the earth, the industry has designated 1959 as a commemorative year.

Texans scarcely need be reminded of why the commemoration has significance for them. Texas and the oil industry have grown up together. Spindletop, discovered in 1901, marked the opening of a new era. Horse and buggy began to give way to a honking family car. Dust-choked drivers demanded and got paved highways. Better transportation—mostly dependent upon gasoline—stimulated the growth of Texas cities. Oil wells, scarcely disturbing nearby herds of cattle, pumped new economic wealth into the accounts of landowners.

A few significant figures will establish how thoroughly oil undergirds the entire state economy:

- Oil or gas has been found in commercial quantities in 195 of the 254 counties in the state.
- One out of every eight persons in the state works directly in the oil and gas industry. In addition, thousands work in other jobs which are largely devoted to supplying the oil and gas industry with materials, services, and equipment.
- Estimated net investment in the state by oil companies probably approaches $10 billion—about $50,000 per employee. This capital investment is three times as great as the average per employee for manufacturing in general.
- Through royalties and leases the oil industry by 1958 had paid more than $360,000,000 into the state permanent school fund and more than $300,000,000 into the permanent university fund—a hearty proportion of the state's investment in public education.
- To farmers and other property owners in the state, the oil industry made royalty payments of $580,000,000 in a single year (1957).
- The Texas state government collected from the oil and gas industry and its products more than $380,000,000 in taxes in 1957. In addition, many local units of government depend heavily upon taxes from oil and gas.

Three factors may be singled out as having an important bearing on the development of the oil industry and its subsequent effect on the state's economy.

The first is obvious—the oil was there. Enough oil is produced in Texas each week to provide six gallons for every inhabitant of the U. S, By the end of 1958, the Texas oil reserves were estimated at 48.2 per cent of the nation's reserves.

The second factor is a quality that seems to be strong in most American people: a willingness to take chances with the hope of returns. The combined findings of geologists can merely point out certain rock formations favorable to the accumulation of oil; no one has ever devised a means of knowing for certain that the oil is really there other than by drilling a well. If operators always "played it safe," there

...they grew up together

would be few if any oil wells drilled. By 1958 there had been drilled in Texas about 138,000 dry holes, representing sweat and toil and heartbreak, along with many a vanishing fortune. But the willingness to gamble on a dry hole made possible the drilling of about 301,000 wells that proved to be producers. Of this total more than 200,000 were producing in January 1958.

The third factor is a political climate favorable to private individual initiative. Whereas governments in most countries claim all subsurface rights, the American system challenges the individual to seek out and develop underground resources. Government regulation enters the picture only to preserve the resources from waste or to prevent infringement of one person's rights by another.

On the occasion of the oil industry's centennial year, this section of *The Humble Way* is dedicated to the oil industry of Texas. Milestones in the progress of Texas oil will be reviewed in the following pages; and then a quick look will be taken at the place of oil in the modern Texas scene.

EARLY MARKERS FOR OIL IN TEXAS

Indians. Legends and tales of Indians of the Southwest, heard by the first white settlers, told of seeps and springs where a strange greasy substance bubbled to the surface of the water. Bathing in this water seemed to relieve rheumatic pains. Applied to cuts and burns it lessened the pain and irritation. Some brave redskins drank some of the liquid to rid themselves of "internal agonies."

Spanish. Sixty-four years before the first Englishman landed at Jamestown, on a hot stormy day in July, 1543, Spanish ships sailed into a protected bay near what is now Sabine Pass. They carried survivors of DeSoto's expedition, trying to make their way back to Mexico. They found, floating on the water, a dark scum which resembled somewhat the pitch they used back in Spain to calk the hulls of their ships. Records published later in Portugal tell how these Spaniards painted the bottoms of their ships with this strange substance.

Drivers of Spanish wagons and carts, as early as 1790, stopped regularly at a small oil spring near Melrose in Nacogdoches County to lubricate the axles and wheels.

Early Texan. The first successful oil well in Texas was drilled by Lynis T. Barrett, near the present town of Chireno, out from Nacogdoches. Barrett, before the Civil War, utilized oil seepage for medicinal purposes and sold it by the bucketful for lubrication. The news of the Drake well in Pennsylvania excited his interest, but the Civil War intervened. In 1866 Barrett sank a shaft 106 feet into a small reservoir of oil to increase his supply for local sale.

Corsicana oil, discovered by accident in 1894 during the drilling of a city water well, set the stage for Texas' dramatic development as an oil-producing state. Finding a market for Corsicana oil became a problem, since there were no refineries in the area.

CORSICANA

. . . the opening curtain

IN 1894 Corsicana city officials became concerned that the town's water supply might become inadequate for the needs of its 9,300 citizens. They let a contract to the American Well and Prospecting Company to bore three water wells. In taking this simple yet essential step those city fathers had little idea that they were opening the doors to a remarkable new era in the state.

On June 9, 1894, while drilling at slightly deeper than 1,000 feet, the drillers became exasperated when heavy black crude oil began to move up the pipes. The workmen had to go to considerable trouble, after they struck artesian water at 2,470 feet, to case off the oil and keep it from contaminating the water.

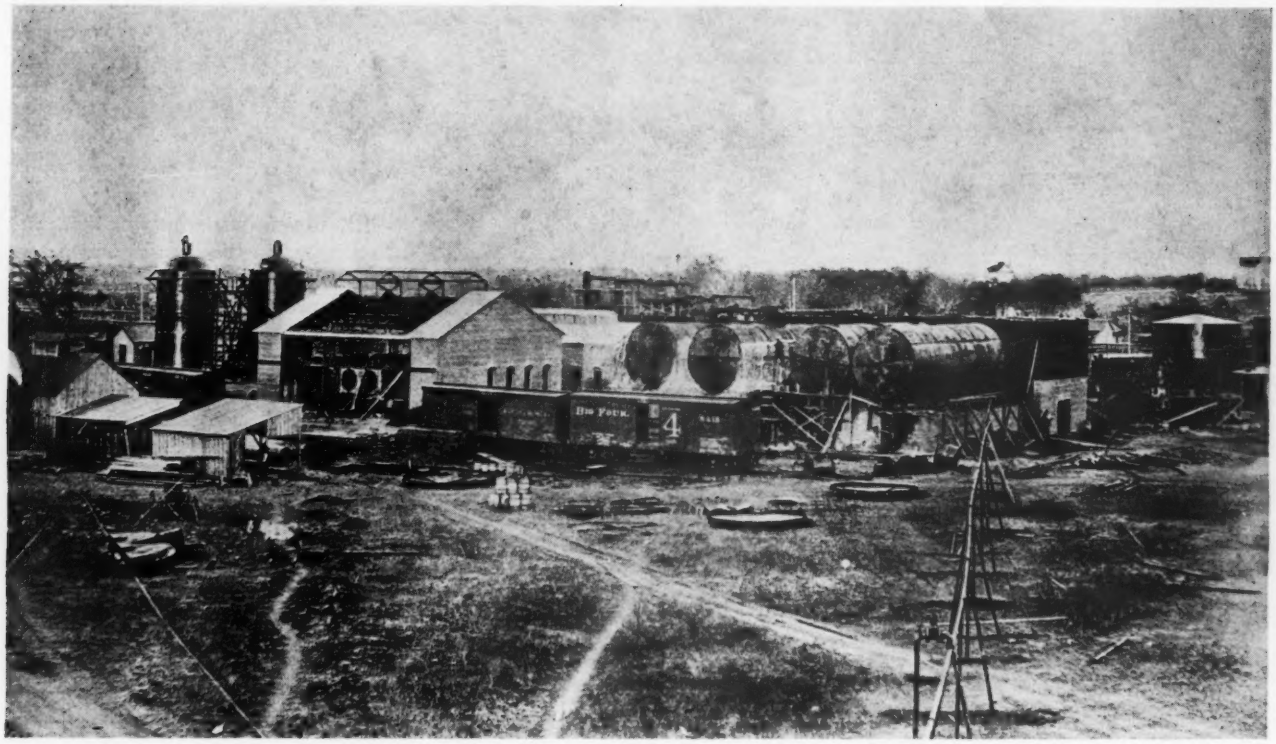
Efforts to shut out the oil could not prevent some of the black crude from permeating the ground around the well. When the news spread in the town, curious spectators came to look and comment—and some remained to smoke. The result—a flash fire destroyed the derrick. Despite warnings, a second and third derrick burned in similar fires; and the contractors almost went bankrupt.

Oil stirred some excitement—but the discovery seemed relatively insignificant. What could you do with oil? Primarily, petroleum derivatives found use as medicine and kerosene, and to a limited extent as lubricants. But major markets were far away, means of transportation were undeveloped, and facilities for processing more than small quantities of crude oil were non-existant in Texas.

However, two local businessmen, Major Alexander Beaton and H. G. Damon, believed that markets could be created if oil were available; and they were willing to stake their money on this possibility. They enlisted the support of John Davidson, an experienced Pennsylvania oil man, and secured the first oil lease in Corsicana on September 6, 1894.

Their first efforts gave small promise. The first well, drilled 200 feet from the city's artesian well, tapped the oil sand at 1,030 feet; but failed to yield the expected profits. Their second well proved to be a dry hole. It would have been easy to abandon the venture at this discouraging prospect; but the three men persisted. Their third, fourth, and fifth wells completed by August 5, 1896 were mildly successful, producing from 20 to 25 barrels a day. This output brought total Texas production to 1,450 barrels for the year 1896. There was no hint that within a half century the state output would swell to more than 750,000 times that amount.

Suddenly, oil fever broke over Corsicana and the surrounding territory.



First important oil refinery in Texas was this one built by J. S. Cullinan Company at Corsicana. The plant, shown here under construction, went into operation on Christmas Day, 1898, fed by oil bought on contract from local producers for fifty cents a barrel.

Operators and promoters from Pennsylvania, Ohio and Indiana flocked to the town. Hotel clerks stuck cots in every corner, owners of private homes rented every room, and makeshift houses appeared. Every available lot in town was leased, and lease hunters scurried to nearby farms. Derricks popped up all over the east side of the city—in front yards, back yards, and horse lots. Frequently, wells jostled each other across property lines. Output for 1897 in Texas jumped to 65,975 barrels, primarily because of the Corsicana field which covered an area five miles by two miles.

Oil supply exceeded demand. Tanks hastily built for storage failed in capacity, and the oil ran over, soaking into the ground. Though oil sold for one dollar a barrel in Pennsylvania, it could not be moved in Corsicana for 50 cents.

Corsicana city officials sought a solution to this dilemma. Mayor James E. Whitesell invited J. S. Cullinan, oil man living in Pennsylvania, to inspect the Corsicana field. Cullinan arrived in Dallas on October 13, 1897. His visit was considered so important to the state that Governor Charles A. Culberson met him in Dallas and went to Corsicana with him. As a result of the visit, Cullinan agreed to establish a refinery. He contracted with oil producers for delivery of more than 100,000 barrels of oil at fifty cents; then returned to Pennsylvania to secure the financial backing he needed for the venture.

After he had ordered materials to build the refinery, Cullinan's financial backers got cold feet and withdrew. At this stage, in 1898 Calvin N. Payne and Henry C. Folger offered to put up $150,000 and form, with Cullinan, the J. S. Cullinan Company; this company later was to become the Magnolia Petroleum Company.

On Christmas Day, 1898, Cullinan gave the signal to start firing the stills of the new refinery. The Cullinan plant with six crude oil stills, two other stills for steam, and a tankage capacity of 150,000 barrels became the first refinery to operate continuously and successfully in the state. On February 24, 1899, the first shipment of refined oil left Corsicana.

With oil available in greater abundance than ever before, new uses had to be developed; and Corsicana played a part in this widening outlet. In 1898 Corsicana became the first city in America to experiment with sprinkling streets with oil to settle the dust. Even more significant, during the same year Corsicana oil men persuaded the Cotton Belt railway officials to begin using oil as fuel in a locomotive on the run between Corsicana and Hillsboro. Three years later the Houston and Texas Central Railroad adopted oil as a fuel for their locomotives. By 1905 the Santa Fe had 227 oil burning engines on the line.

The Corsicana field provided merely the introductory act to the drama of Texas oil. Its production was to be overshadowed by the output of greater fields to be discovered. But its pattern foretold the procedures that led to the development of the southwest's oil industry—venturesome exploration and drilling, establishment of refineries to process oil close to production, and continuous searching to discover new uses for oil and its derivatives. By the turn of the century, oil was beginning to change the course of life in Texas, foreshadowing the wide-spread industrial expansion that would result from a petroleum-based technology.

SPINDLETOP . . . *doorway* to

Lucas discovery well, gushing over the derrick at Spindletop, on the Texas Gulf Coast, proved oil could be found in large quantities, heralded a new era in petroleum history.

TEXAS was barely into the new century when the dreams and determination of two men made it the world focal point in oil production.

The Lucas gusher at Spindletop in 1901 was not the state's first producer —Corsicana had been turning out and refining petroleum for some years. But Spindletop gave us the world's first 100,000-barrels-a-day well and the first proof that oil could be found in large quantities. Oil men before then had worked mostly with wells of less than 100 barrels daily.

This gusher that ran wild for nine days and heralded a new era in petroleum history with a spray of oil 200 feet into the air, was a result of the faith and wisdom of Pattillo Higgins and Anthony F. Lucas.

It all started some years before when Higgins was trying to organize a brick business that never developed. He had found high grade brick clay in the Beaumont vicinity, and had interested some investors in starting a brick factory. Then he went East to see how bricks were made. There, he learned that oil and gas were the most economical and dependable fuels for such an industry, and he returned convinced that if other areas had found oil, there was no reason this necessary fuel could not be found in his part of Texas.

Higgins began to study geology, and although the brick venture fell through, this self-taught geologist became more and more convinced that oil lay beneath a dome of ground located some four miles from Beaumont and called Big Hill by the townspeople. It stood 20 feet above surrounding terrain and once was covered with a clump of trees so that it resembled the top of a spindle.

It took a lot of talking to get anyone to believe him, but on August 24, 1892, Higgins joined with George W. Carroll, George W. O'Brien, Chenault O'Brien and E. E. John to form the Gladys City Oil, Gas and Manufacturing Company. By 1896 the company, with $200,000 capital stock, had drilled three holes—all unsuccessful.

o abundance

Rotary drilling, new to the industry, proved its merit at Spindletop. Equipment, as seen in this old picture, was crude and hazardous compared to today's safety-engineered rigs.

Along the way, they encountered almost every possible problem, from internal company squabbles to a collapsed derrick, quicksand, and virtual isolation by floods.

Still, Higgins remained unshaken in his belief that there was oil under Big Hill, for he saw too many "obvious" indications, such as escaping gas. His hopes of bringing other money into the venture were shattered when a state geologist named William Kennedy was quoted by a Beaumont newspaper as advising investors "not to fritter away their dollars in the vain outlook for oil in the Beaumont area."

So Higgins decided to advertise for help in other parts of the country, and his advertisement brought only a single inquiry—from an Austrian-born mining engineer named Captain Anthony F. Lucas.

Lucas had worked three years with a salt-mining company at Petit Anse, Louisiana, and had become interested in the low-elevation mounds that occurred as domes along the Gulf Coastal Plains. In his work with masses of salt deposits, he had observed signs of oil, gas, and sulphur in many of them, and had developed a new theory. Lucas believed these domes were geological structures—plugs of rock salt—distinct from surrounding terrain, and since seepages were found near many of them, he concluded that they made it possible for either oil or sulphur to accumulate above them.

Spindletop's Pattillo Higgins and Al Hamill revisit field in 1951 on 50th anniversary.

Lucas was looking for a prospective place to invest his own capital when he answered Higgins' advertisement, and he actually was more interested in finding sulphur than oil at the time.

The first Lucas well went down to 575 feet, with encouraging signs of gas and oil, but gas pressure collapsed the pipe and the venture soon ran out of funds. Local investors refused to sink more money into this unproven theory, and Lucas induced a Pittsburgh wildcatting firm of Guffey and Galey to refinance him.

Two resourceful Corsicana brothers, Al and Curt Hamill, were brought to Big Hill to drill some 310 yards southeast of Higgins' first well, and in October of 1900 they spudded in what was to become the Lucas gusher. A third Hamill brother, Jim, remained in Corsicana to keep the home business going. Instead of using the previously unsuccessful cable tool method of drilling, Al and Curt Hamill tried the recently-invented rotary drill with a four-inch drill stem. Then they developed the idea of using drilling mud—made by running cattle through water in a slush pit—to solve the quicksand problem of earlier wells. They found that mud circulated in the hole would keep the soft or loose sides intact.

The new well reached 1,160 feet by January 10, and the crew had just installed another fishtail bit and started lowering drill stem into the hole when there came an earth-shaking roar and things began to fly. Mud bubbled over the rotary table, and as the crew scampered in all directions, the four-inch drill stem cascaded out of the hole, knocked off the crown block, and broke into sections that rained down over the area. Then all was quiet.

The drillers were in the process of wondering what they could do with such a mess when there was another roar, a new rush of mud and a powerful blast of gas. As the crew dashed once more for cover—and one member, Peck Byrd, tripped head-first into the slush pit—a spray of oil and rocks shot through the derrick floor. Then a steady geyser of heavy, green oil spouted twice the height of the wooden derrick.

Nine days passed and some 800,000 barrels of oil drenched the area before the well was brought under control in the midst of a 100-acre lake of oil. Lucas had hired 90 guards to keep away thousands of curious people and had 40 four-horse plow teams build levees.

As Lucas feared, the oil caught fire. Some sources say the cause was a spark from a passing locomotive. Others say it was a discarded cigar, but whatever the cause, it seemed then like a holocaust as the oil-soaked area fed flames and a column of smoke that could be

seen in Beaumont and Port Arthur. The fire was beaten under control and the well—which had been capped and covered with a mound of dirt—came through the crisis undamaged.

America had an oil boom that put those of the past in the shade. No one knows just how many people were lured by visions of quick wealth, but it is estimated the population of Beaumont virtually doubled within two weeks. Thousands of oil men from all over the country moved into the area in search of leases, and the *Beaumont Enterprise* noted later that 20,000 adventurers, gamblers and confidence men flooded the dazed little city that was totally unprepared for such an invasion.

Drillers began sinking wells in rapid succession until some 500 derricks were standing on a 150-acre tract and one could step from the floor of one to that of another.

The stories out of this period are many and varied. It is said that a Dallas man arrived one day with $136 in his pocket and three weeks later had a bank account of $65,000. But many others fell easy prey to those men who were sharper than themselves. Newspapers tell how water sold for $6 a barrel and men with $1,000 bills in their pockets went hungry for lack of a sandwich. And there was waste everywhere—waste in men, money and oil.

The field produced some 42,000,000 barrels of oil during the first ten years—at a time when oil was in limited demand—and prices were driven down until some producers received only three to ten cents a barrel.

OIL SUPREMACY

If the Drake well heralded the birth of an industry, surely it was Spindletop in Texas that changed the fledgling into full plume. For it was the Lucas well at Spindletop that made oil plentiful for the first time.

The Lucas gusher, which roared in on January 10, 1901, is estimated to have flowed some 100,000 barrels a day—many times that of any previous well. It showed for the first time that oil could be found near salt domes, that wells could be drilled through loose, unconsolidated sands, and it pioneered a new method of rotary drilling and the use of drilling muds.

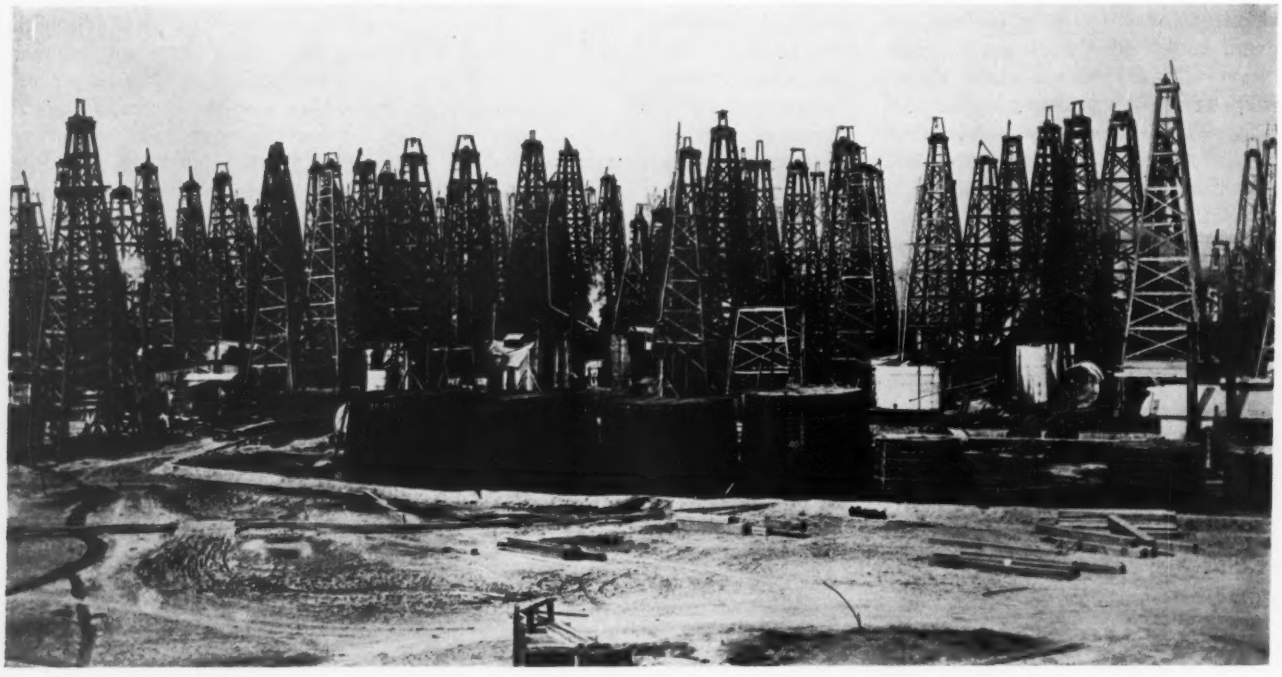
Spindletop also made it possible for America to regain from Russia the lead in oil production. That didn't seem so significant at the time, but it is a lead the United States never again relinquished. Russia had been the world's largest producer of crude from 1898 to 1901, when her production totaled 233,337 barrels daily, compared with 190,108 for the United States.

The Spindletop of later years is a story of disappointment. Many men put far more money into it than they ever recovered. Crude found there was not suited for kerosene—the chief product of the early days—and by the time a new demand finally was created for Spindletop oil, the supply from the dome once called Big Hill had diminished to a dribble and interest had focused on other parts of the country.

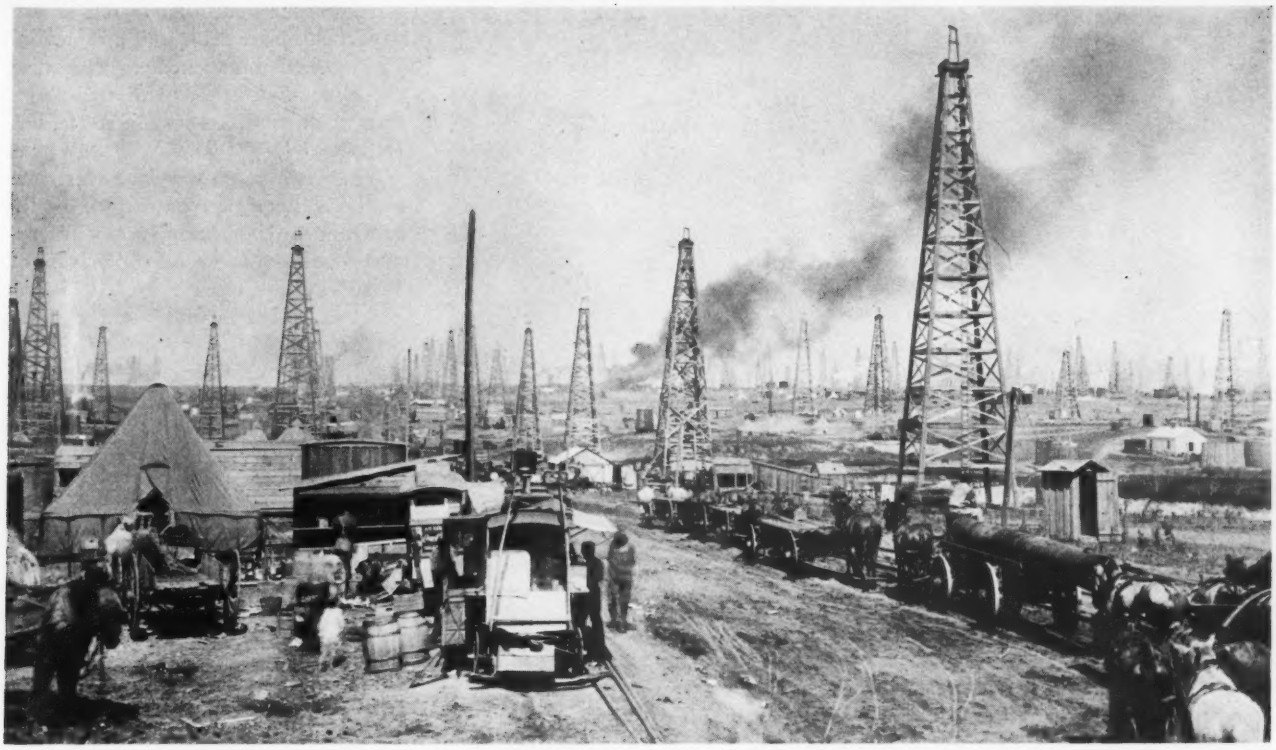
Spindletop was spectacularly revived in 1925, when drillers found new, deeper oil deposits on the flanks of the dome (original production was from caprock on top). Production from the area reached a peak of 20,751,000 barrels in 1927 and then began to decline sharply again.

But that does not detract from the tired field's glory, for Spindletop pointed the way for a new industry, and today the location of the Lucas gusher is marked by a 58-foot granite monument that reads in part:

"On this spot, a new era in civilization began. . . . Petroleum has revolutionized industry and transportation; it has created untold wealth; built cities, furnished employment for hundreds of thousands, and contributed billions of dollars in taxes to support institutions of government. In a brief span of years, it has altered man's way of life throughout the world."



Forest of derricks on Spindletop's Hogg Swayne tract in 1903 is classic example of wasteful development resulting from a lack of understanding of oil reservoirs. As petroleum knowledge increased, oilmen learned to develop fields on sound conservation principles.



Burkburnett field, discovered in 1912, was an important addition to the newly developing North Texas oil region. It helped dispel a growing belief that Texas was barren of any significant oil deposits outside of the area of salt domes along the Gulf Coast.

WESTWARD

. . . upstate finds change geologic theories

BEFORE oil came to be discovered in West Texas, some widely accepted theories about finding oil had to be broken down. Such theories presented a roadblock to oil exploration in the state almost from the beginning. For example, a state geologist told Patillo Higgins that no oil could be found at Spindletop because "rock is necessary before you find oil." But Higgins and Anthony Lucas proved the geologist wrong, and thus changed the theories to relate oil to salt domes.

The success at Spindletop quickly froze the pattern of exploration into a new mold—largely limiting the search for oil to Gulf Coast salt domes.

Three other major producing areas were developed along the Gulf Coast, and it became generally accepted that the remainder of the state was barren of petroleum because of the absence of salt domes. The earlier discovery at Corsicana was generally discounted as a "freak."

The first indication that something was wrong with this theory came unexpectedly in North Texas at Electra. W. T. Waggoner had put down three deep wells some distance northwest of Wichita Falls in search of artesian water for his cattle, but each of the wells hit salt water that was further "contaminated" by traces of oil. And the next well in 1904 proved no better for this rancher who told a newsman later, "damn the oil, I want water." Waggoner failed to find fresh water at 1,700 feet, pulled out his well casing, and the sides caved in to form a rather shallow pit. It filled with oil.

Before long, oil scouts had moved into the area, a company was formed, and Electra became a producer in 1911. Then another field was found in 1912 at nearby Burkburnett, and Wichita Falls became the hub of the North Texas oil region. The oil came from thin Pennsylvanian beds about 1,800 feet deep.

An unusual occurrence of oil was first found in 1915 when Fritz Fuchs, a driller seeking water, brought in an oil well from 800 feet at Thrall. The oil was trapped in Serpentine, a dull green colored rock, which was formed from altered igneous rock. Considerable exploratory activity followed in the Southwest Texas area and, although several additional Serpentine fields were found, this type of trap has remained insignificant as an oil producer but has continued to remain prominent as a geologic oddity.

The next proof that salt domes were not the lone source of Texas oil came

Breckenridge townsite field, seen here from a low-flying airplane, reached its production peak in 1921. From top of the court house an observer once counted two thousand derricks.

a few years later in a central part of the state, where attention became focused on the association of oil and fault lines. This time it was Mexia in 1917 and the drilling crews weren't looking for water—they wanted natural gas. They decided to look for it along the same fault line that earlier produced gas for Corsicana and extended down to Mexia.

A banker named Blake Smith organized in 1912 a company of 100 businessmen who agreed to pay $1,000 each toward the drilling of ten wells. The company put down nine holes without success, and Smith talked the contractor into sinking two more for the price of that tenth one. It was fortunate he did, too, for the tenth hole was a duster, while the eleventh brought in plenty of natural gas for Mexia and enough left over to supply Corsicana, Waco, Mart, Groesbeck, and Teague. Five years later this supply also became depleted, but by then Mexia had its first oil well and a wild boom.

Many people in Mexia had believed for some time that their gas wells were over or near an oil pool. They knew that Corsicana had found oil along with the natural gas, and they believed the same might be true for them as the fault line passed down near Mexia. But it was not until 1920 that a consulting engineer named J. Julius Fohs and a silver miner and oil man, Colonel Albert E. Humphreys of the Humphreys Oil Company, overcame several setbacks to bring in a 50-barrel-a-day discovery well at Mexia. There was the story all over again of a boom town gone wild. Two real gushers blew in by 1921—one flowing 18,000 barrels and the other 24,000 barrels a day—and the population of Mexia jumped from 4,000 to an estimated 40,000 in just a few days.

Another important oil field was opened in 1923 at Luling, located farther south along a similar fault system that produced oil at Mexia.

These discoveries, along with numerous minor ones along the belt of Central Texas and eastward, certainly were major achievements for the state in their own right. But perhaps they had another, secondary, effect that also was significant. They changed the trend of thinking away from sole dependence on the salt-dome theory toward an idea that other regions of the state held potential oil production. Theory had broadened to recognize the association of oil with fault lines such as those at Corsicana, Mexia and Luling.

Then two more developments—the southerly migration of surface geologists and an inaccurate geological report—brought about oil exploration of West Texas.

It was about this time that a group of surface geologists began moving slowly southward through Oklahoma and into western portions of Texas, surveying as they went. They were looking for surface evidence of subterranean structural formations which they had learned elsewhere sometimes contained oil.

A geological report in 1917 stirred additional interest in the virtual no-man's land of West Texas, where a few cattlemen and sheepmen barely subsisted. J. E. Beede, a state geologist at Austin, wrote a pamphlet in which he postulated that a folding structural formation of the Marathon Mountains extended northeastward into West Texas from north of the Big Bend area. His hypothesis proved in time to be incorrect, but his theory was influential enough to stimulate interest in an area that later became the Big Lake oil field.

West Texas oil had a rather unimpressive beginning that gave little indication of the prolific Permian Basin it covered. It began in 1920 near Westbrook, a small town about ten miles west of Colorado City. Steve Owens, a general field manager for the Underwriters Producing Company, and a wagon driver brought eight wagons of equipment and derrick wood

Street scene at Ranger in 1919 typifies oil boom towns of that era. Among the operators in the Ranger field was Humble Oil & Refining Company, which had been organized in 1917.

into the area, staked a well site—which he located by surface geology—and began to drill. What these men hit in 1921 was not too productive, as they bailed some 25 to 30 barrels a day, but it was enough to pull oil scouts into the area with visions of a new field.

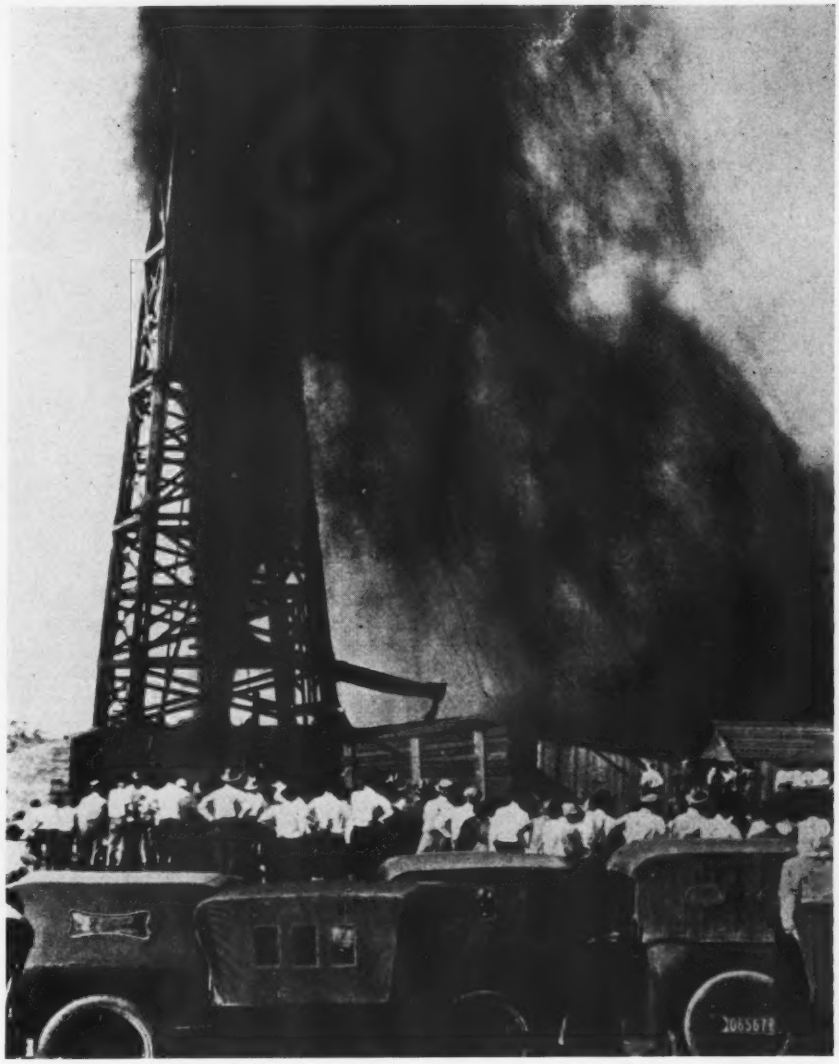
The real bonanza came with completion in 1923 of the Santa Rita discovery well in the Big Lake field—a wildcat that flowed an estimated 200 barrels a day. Then exploration in the region moved rapidly, sending production figures high: There was McCamey in 1925; Yates, Hendricks and McElroy in 1926; Howard-Glasscock in 1927; and many others. By 1929 West Texas was accounting for almost half of the total production in Texas.

West Texas production is significant to the state for two reasons—reasons that are in addition to the usual importance of a prolific oil supply. One is the value this region had to Texas' major state-supported university system, and the other is the plan of voluntary proration that was established here and later embodied in the state conservation laws.

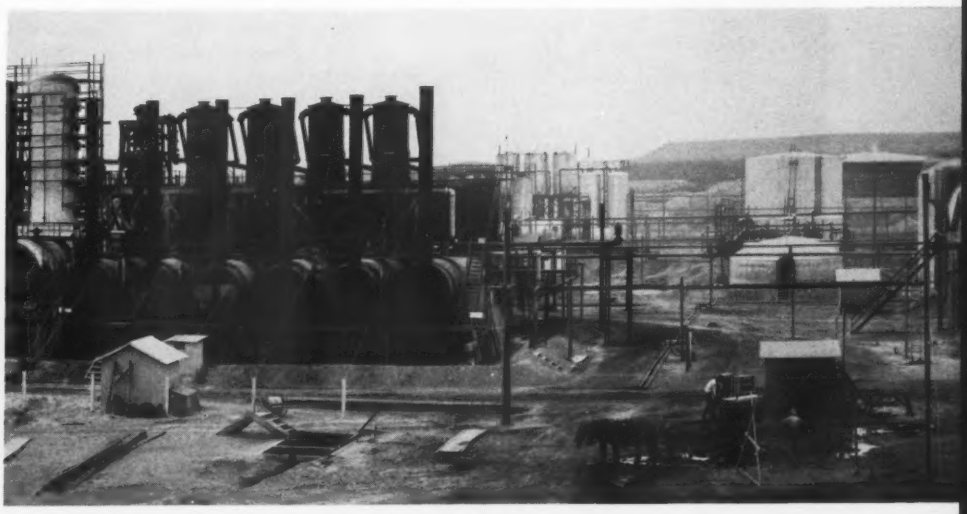
When Rupert P. Ricker, who played a major part in opening the Big Lake Field, first leased a plot of land, it was 431,360 acres in four counties and all belonging to the University of Texas. And today, much of the West Texas production is on lands owned by the university system, which includes Texas A & M. These schools have received millions of dollars in revenue from royalties and sale of leases during the three and a half decades since West Texas was opened.

Proration—the systematic limitation of production by each operator—was started on a purely voluntary basis in West Texas because of an oil transportation problem. The Yates field, which would have exceeded by far the peak of 113,000 barrels a day set in 1929, had such an enormous flow—and existing pipe line facilities were so limited—that many smaller producers would have been forced out of business if some system of proration had not been established.

The method Texas oil men adopted here furnished the basis and experience for state laws which later became necessary to prevent waste and promote conservation when an even greater field was discovered in East Texas.



Gushers like this caused a rush of oilmen to Mexia in the early 20s. The Mexia field was an important oil producer and spurred further exploration along the great Balcones Fault.



McCamey refinery was built by Humble to handle crude from field discovered there in 1925; by 1929, West Texas was accounting for almost half of the total oil production in Texas.

EAST TEXAS

. . . the nation's largest oil field leads to chaos, then order

COLUMBUS Marion (Dad) Joiner, in the hot summer of 1930, might readily have been a discouraged man. He had already drilled two unsuccessful wells on his Daisy Bradford lease in Rusk County, and things were not going very smoothly on his third wildcat attempt. There was no way of knowing that in October this well would discover the nation's largest and most prolific oil reservoir, the East Texas Oil Field. Twenty-eight years later, in mid-1958, this vast natural storehouse had produced about 3.4 billion barrels of oil, with an estimated total of more than one and a half billion barrels remaining to be recovered.

But Dad Joiner, bulky, grey-haired, and 70 years of age, had no vision of such tremendous results when he spudded in his first well on the Bradford farm in 1927. He had made and lost two fortunes in the oil business before moving from Oklahoma into Texas. Even his own hopes of striking oil in East Texas must have been mild, for he had leased about 1,000 acres in Rusk County in 1922 and let the lease expire without having drilled a well. He renewed the lease for another five years, however; and began drilling in August 1927.

Other oil men were skeptical. Previous drilling in the county had yielded 17 dry holes, and no oil. By February 1928, the well had poked its way to 1,028 feet, but had to be abandoned because the drilling equipment could not carry on. Two months later Joiner had refinanced his venture, and started well No. 2 on the Bradford farm. There followed almost a year of starting and stopping. Periodically, Joiner ran out of money, stopped the drilling, and scoured around for more finances. Finally came the disappointing day when, in March 1929, with the well at 2,518 feet, he gave up hope for oil and abandoned well No. 2.

Joiner sold some of his leases, sought new associates, and raised enough money to start well No. 3 on the Bradford place. Again the spectre of depleted finances haunted him; and drilling operations had to be shut down in January 1930, for lack of cash. Spring found Joiner back at the site, with money scraped up from every available source. By early September the well had reached 3,500 feet; but encouraging signs had appeared in core samples.

Another factor had taken a hand by this time to encourage public interest in these shoe-string ventures of Dad Joiner—the depression. East Texas folk had encountered three years of drouth by 1930; and now found their troubles aggravated by an economic breakdown which was spreading over the whole country. The promise of oil —however feeble—was enough to fan hopes of relief from stark disaster. Therefore, many people followed the progress of Joiner's well with desperate hope.

By October 1 word got around the countryside that the crucial moment was approaching. Farmers, oil men, and casual spectators slogged their way on saddle horses, in buggies, and in mud-impeded automobiles along the small lane that led from the highway to the well. Throughout October 2 more than 4,000 people milled around the well or sat patiently under trees, waiting for something to happen. Men sold hamburgers for ten cents and cheese sandwiches for 15 cents. Venders peddled soda pop. But night came and went, and still there was no oil.

On Friday night, October 3, the

Dad Joiner's Daisy Bradford No. 3 wildcat attracted thousands of visitors, even before it blew in on October 3, 1930, as the discovery well of the great East Texas Oil Field.

Crowd awaits completion of the F. E. Farrell No. 1 Lathrop well, located in Gregg County some 25 miles north of the Joiner discovery. Successful completion of the Lathrop well was strong evidence that the East Texas Field was the biggest in the nation.

well blew in, throwing a spray of gas and oil over the crown block. The throng roared, and Joiner leaned for support against the derrick. Even then he did not realize that he had discovered the greatest oil field the world had known to that time.

As word of the discovery spread, a human avalanche flooded into this small portion of East Texas. *The Dallas News* reported that the road from Henderson to the new well became so jammed with cars that progress could not exceed six to eight miles an hour. Oil scouts and promoters scrambled for leases over the countryside. Property which could have been bought a few days earlier for ten dollars an acre shot up to $800 and $1,000. Wells began to go down with feverish haste.

Joiner, shortly after his discovery, sold his holdings for $40,000 cash, $35,000 in notes, and $1,200,000 in oil. Where the lane left the highway to go to the Daisy Bradford well, a small town sprang up to be named Joinerville.

The East Texas field consolidated around three major wells—Joiner's No. 3 Daisy Bradford; the E. W. Bateman No. 1 Lou Della Crim well, 10 miles to the north; and the F. E. Farrell No. 1 Lathrop well, 25 miles north of the discovery. It was the Crim well which first hinted that the new field was of huge proportions; the Lathrop producer gave further indication that the size of the reservoir far exceeded any other known discovery. In February 1931, Humble purchased the lease on which the Crim well had been found and immediately became an active operator in the field.

Boom days hit the East Texas towns. Kilgore jumped in a few months from 1,000 to 8,000 or more. A visitor reported that shacks were springing up like mushrooms and 1,500 to 2,000 carpenters were at work in the town. On January 1, 1931, Longview had a population of 5,025; in February, the population exceeded 10,000. Humble opened offices in Longview, as did several other oil companies, and built a warehouse near the edge of town.

By the end of 1931—less than 15 months after Dad Joiner's discovery—some 3,612 producing wells could be counted in the East Texas Field and production had skyrocketed to a total of 109,000,000 barrels. But that was only the beginning. After two more years of intense activity the immensity of the reservoir had been outlined—133,400 productive acres in an area 43 miles long and averaging five miles in width. By the end of 1933 the East Texas Field had 1,714 operators on 2,896 producing leases.

But the unprecedented boom also produced problems that threatened to offset its blessings. Economic troubles mounted. Crude oil sold for an average of $1.10 a barrel when Joiner drilled his well. Under pressure of the

Cars and people packed Kilgore's Commerce Street in the boom days of the great East Texas oil field development. Similar scenes could be found in several other towns of the area.

tremendous new output—averaging almost 300,000 barrels a day in 1931 and mounting to the remarkable peak of 1,000,000 barrels daily in early August of that year—prices were shattered; and finally, producers found it difficult to get ten cents a barrel. Under such conditions waste of oil and gas was inevitable, and efforts to prevent waste became more expensive than returns from the salvaged oil.

These were chaotic, hectic, disorderly days for the oil industry as well as for the communities within the East Texas Field. But the very chaos in the long run yielded beneficial effects. Had it not been for the intensity of the problems, it is doubtful that the long-range solutions would have been forged which have served to protect and develop the petroleum resources not only of the southwest but throughout the world.

Note, for example, the problem of well-spacing. Final results in the East Texas Field showed nearly 30,000 wells on 133,400 acres, an average of approximately one well to every four and a half acres. Engineers now know that one well on every 40, 80, or even 1,000 acres would have been adequate for proper drainage of the reservoir. Had the field developed on 40-acre spacing the operators would have saved the drilling of 26,000 wells at an average cost of about $15,000, or a total investment of almost 400 million dollars.

The chaos of the East Texas Field led to the study of well-spacing and eventually to regulations and voluntary agreements to be applied in later discoveries.

The economic breakdown which resulted when oil supply leaped far ahead both of available means of transportation and of current demand brought certain inevitable results. Pipeline construction began to lay a pattern of oil transportation that would serve the future as well as the present. The flood of oil released upon the country spurred efforts to develop new uses for oil.

But the result for which, perhaps, the East Texas Field will be most remembered is the development, through a baptism of violence and struggle, of a system of proration and regulation to conserve the vast oil resources of the land.

James A. Clark, in a booklet published on the twenty-fifth anniversary of the discovery of the East Texas Field, pays tribute to the field with these words:

"The great Black Giant, as it has been called by more poetic writers, is the living symbol of the oil producing industry as we know it today. It was there that oil men saw the last boom. It was there that the day of feast and famine came to an end and an era of stability came into being in the oil industry. It was there that profligate oil waste had its last fling and men learned the lessons and the art of modern petroleum conservation."

Humble's camp at New London looked like this during the development of the East Texas Field. Humble became active in the field in 1931 when it bought the Lou Della Crim lease, 10 miles north of the Joiner discovery, on which E. W. Bateman had hit production.

Gas processing plants such as this one of Humble's at Jourdanton have eliminated wasteful flaring of casinghead gas produced with oil. Now, useful liquids are extracted and the dry gas is either sold or reinjected into the reservoir to help maintain pressure.

CONSERVATION

. . . ends chaotic development, insures future supplies

CONSERVATION in Texas has been a story of ever-increasing benefits for both the oil industry and the consumers of petroleum.

East Texas not only gave us the largest, most prolific oil field in the United States, it also played a major role in bringing about conservation methods which since have increased manifold our estimated recoverable reserves.

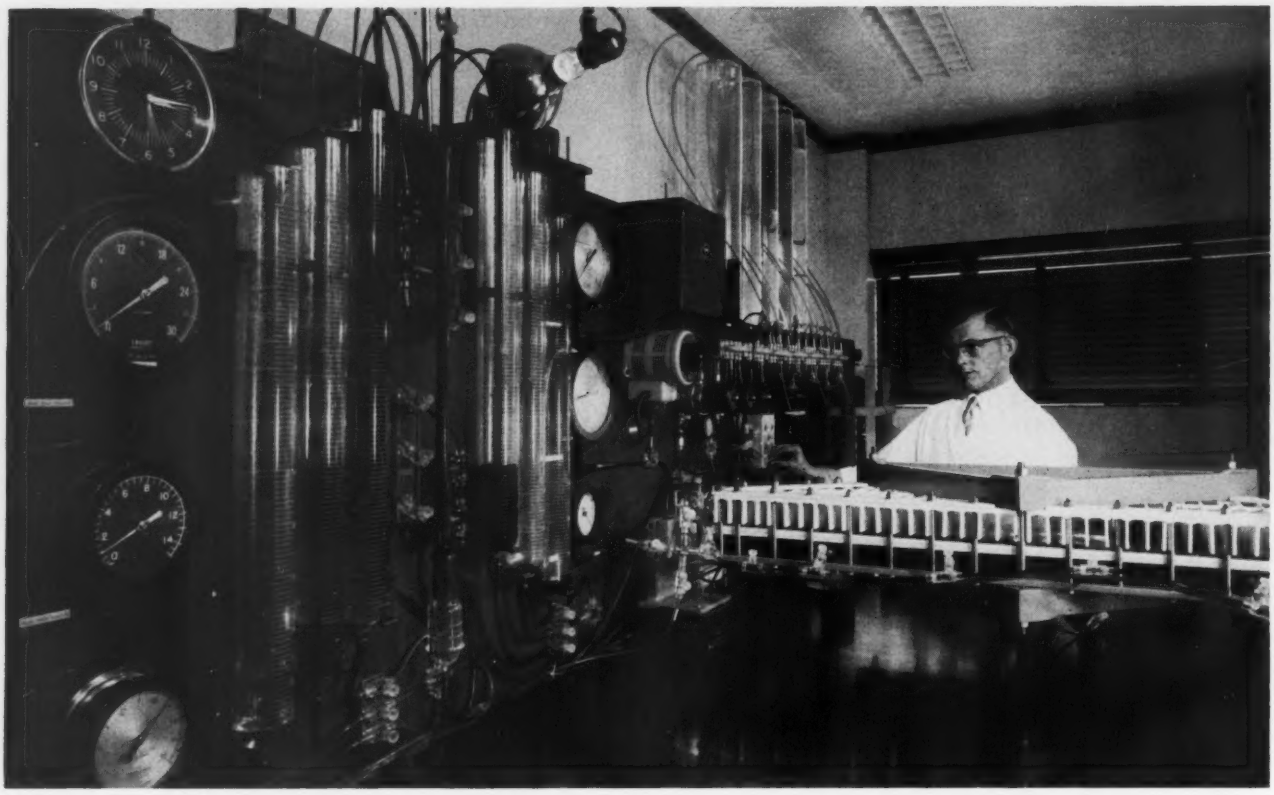
The flood of oil that "Dad" Joiner's discovery released on an already saturated market had the alternative of either fostering an expanding petroleum industry or wrecking it completely. But the decisions made then brought system and order to a segment of our economy that was rampant with confusion and chaos.

East Texas was not the beginning of conservation efforts—it was a major change in what until then had been a difficult battle against costly waste.

The Texas Legislature took the first steps toward oil conservation as early as 1899. Experience at the Corsicana field caused the lawmakers to enact in that year House Bill No. 542, entitled, "An Act to Regulate Drilling, Operation, and Abandonment of Petroleum Oil, Natural Gas and Mineral Water Wells, and to Prevent Certain Abuses Connected Therewith." This law, in effect at the turn of the century, prohibited a driller from breaking into a second oil-bearing sand without first "incasing" the well passing through the first. It also provided for the plugging of an abandoned well to prevent wasting of gas, and outlawed the burning of gas for illumination between 8 a.m. and 5 p.m. There was a fine of up to $100 for each violation.

The provisions against waste of gas were intended mostly to conserve it as a fuel, but they had an equal importance in the increased production of oil. As Railroad Commissioner Ernest O. Thompson has said, "Conservation as applied to the production of oil and gas really means wise use of the motivating energy which propels the oil through the rocks to the well bore." This force is either water or gas.

Governor W. P. Hobby signed in 1919 another law that mainly attempted to initiate conservation practices which would prevent blowouts and fires. By then, disastrous fires had accompanied oil discoveries at Burkburnett, Ranger, Desdemona, and West Columbia. The Legislature, through this bill by Senator R. L. Carlock of Fort Worth, made the Railroad Commission responsible for the prevention of physical waste. The lawmakers specified in the bill, however, that they were concerned with



Laboratory model representing a segment of an oil reservoir helps to solve complex flow problems encountered in waterflooding. Improved techniques and knowledge gained through research have added billions of barrels of oil to this nation's recoverable reserves.

physical waste—they said economic waste was not to be considered.

Then came two new developments: Well spacing and oil proration, providing for a limitation of the quantity of oil produced by each operator to some fractional part of the well's potential capacity. Both of these attempts, one in Oklahoma and the other in West Texas, were entirely voluntary and quite successful.

West Texas had turned to voluntary proration as a practical answer to its prolific Yates field. This field—which had a potential far in excess of its 113,000 barrels a day production of 1929—had the capacity to utilize by itself almost all the pipe line facilities then available in the area. So a voluntary proration was decided upon to help small producers share in the market. Later the administration of this voluntary proration was turned over to the Railroad Commission.

Meanwhile, the Indian Territory Illuminating Oil Company and the Foster Petroleum Corporation had joined forces to bring in a 6,000-barrel-a-day discovery well at Oklahoma City. The companies owned enough acreage around the well to be in a bargaining position with their neighbors, and thus they reached an agreement with surrounding lease-owners for an orderly development of the field. The agreement provided for 21 drilling locations with one well centered in each 40-acre tract, and the scheme proved a success. That was in 1929.

Then a tidal wave of oil hit the nation. The more oil produced, the lower the price fell; and the lower the price went, the more oil flowed, as operators tried to make enough to meet payments on debts and equipment. Already excessive oil output in California, Oklahoma, the Permian Basin of West Texas, and other parts of the nation soon paled before the gushing East Texas field.

The Railroad Commission warned early in 1931 against overproduction and explained that East Texas—which was divided into hundreds of separate ownerships—could bring disaster to the entire oil industry if not controlled. By March, the situation became critical and the Railroad Commission scheduled a hearing. Some 13 Pullman cars packed with Piney Woods oil men rolled into Austin for the stormy session.

The Commission's first order for the field came on May 1, but the order had to be virtually on a voluntary cooperative basis for the Commission had inadequate means of enforcement. The voluntary attempt didn't work: When the Commission set allowables at 70,000 barrels a day, the oil flow reached 150,000 barrels; when the daily allowable was raised to 90,000 barrels, the field produced 300,000; and when the allowable was hiked later to 160,000, the flow increased to 400,000. Then the Commission fixed the daily maximum withdrawal from East Texas at 400,000 barrels, and a court suit broke its "restraint."

The very first Commission order brought 40 injunctions from operators who in many cases agreed with the proration idea but objected to having the tourniquet clamped on their wells. Most decisive of the suits was the famous Macmillan case, in which a court overruled the Commission's orders in July of 1931, declaring that the order had no reasonable relation

to physical waste, but that it was designed to "deal directly with economic waste—the loss of market price because of market glut."

Effective regulation suffered a severe setback. Soon conditions became so chaotic in East Texas that the Commission, unable to enforce its regulations adequately, relinquished "control" of the field to martial law in August, 1931. Numerous laws and regulations in the next few months helped very little, and the lawmakers —undoubtedly mindful of the Macmillan case—continued to legislate against physical waste while denying consideration of economic waste.

Then a break came in the deadlock. The United States Supreme Court upheld a market demand law in Oklahoma; and in 1932 the Texas Legislature at the urging of the Railroad Commission—enacted legislation making it illegal to produce more than could be marketed. This law permitted the Commission to space wells, grant or deny drilling permits, probate production, and limit the above-ground storage of petroleum. This right of the Commission to limit production to current market demand was upheld in the 1932 Danciger case.

That was not the end of the story, of course, but the remainder was a question of enforcement and includes many oft-told tales of horse-borne troops, Texas Rangers and Commission investigators who had to wage battle as some irresponsible operators resisted with knives and guns. Also another fight loomed ahead with the hot oil operators.

The term "hot oil" had come into use earlier to describe petroleum produced illegally in violation of Railroad Commission regulations. Some hot oil runners would simply tap a neighbor's pipe line and steal his oil; others would connect a flow line into their own casing below the surface so the production would not be gauged. Some used "left hand" valves that turned the opposite direction so an investigator, thinking he was closing down the well, would unknowingly lock it wide open.

By September, 1933, the Texas Legislature made it a felony to produce oil in excess of Commission orders, and this ruling was further strengthened by federal enforcement assistance. Later the Connally Hot Oil Act prevented shipment of illegal oil between states, and additional state laws closed other gaps in the regulation problem. Now the Railroad Commission's job of control goes relatively smoothly.

The Railroad Commission was not organized originally to regulate the oil industry. As its name implies, the Commission's first duty was to control Texas railroads—a job it still does. It was created in 1891 by a law patterned after the Interstate Commerce Act of 1887. The Legislature later assigned to it the direction of petroleum production largely because it was the only state agency in the early days with any regulatory experience.

Today, its vital function for the oil industry is the prevention of waste. Physical waste has to do with loss of this non-renewable resource, petroleum, either above or below ground and includes the dissipation of reservoir energy. Waste above ground will result from production in excess of market demand, and it is to prevent such waste that the Commission restricts the state's production to market demand. The Commission never considers the price at which oil and its products are selling.

Allowable production for Texas is determined by the Commission with a broad formula that is guided by market demand. Purchasers' nominations—the amounts all oil companies expect to need during a coming month —and forecasts made by the United States Bureau of Mines are balanced against the current stocks above ground, so that an adequate supply will be on hand. Excess stocks above ground not only require expensive storage and create fire hazards, but also lead to waste through oil deterioration and evaporation. Railroad Commissioner Olin Culberson has pointed out that the commissioners "consider in all maybe 40 factors, including the ability of the wells to produce and ability of the pipe lines to transport the production" when they set allowables.

When the East Texas field was discovered, experts said the reservoir would produce something like 1,000,000,000 barrels of oil. That, of course, was under the old open-flow production methods. However, oil men already have brought more than three times that much oil out of the field, and now experts say a total of more than 5,000,000,000 barrels can be recovered if current controlled production methods are continued.

Reservoir engineering and conservation regulation now make it possible to get up to 80 per cent of the oil out of an oilfield, instead of only 20 per cent that was recoverable in many cases under the open-flow methods of 30 years ago.

Modern oil fields are developed in an orderly manner with due regard for maximum efficient rates of recovery so that pressure is maintained and the life of the field is prolonged.

OIL IN MODERN

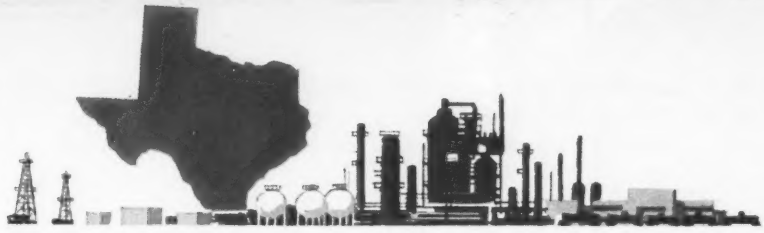
SINCE the Spindletop discovery in 1901 the oil and gas industry in Texas has accomplished a transformation of the state's economy. It has, according to *The Texas Almanac*, "contributed, directly and indirectly, most of the assets of Texas' banks, insurance companies and other financial institutions, built most of its skyscrapers, and contributed most of the income to sustain the trade in its princely department stores. Oil and gas have enriched the farmer in rents and royalties . . . Oil and gas have borne much of the cost of the educational system of Texas, including public schools, state higher educational institutions and privately supported universities and colleges . . . Oil and gas millions have contributed most of the patronage of the arts and sciences—the cultural advancement of Texas."

But this tremendous influence on the economy of the state has not been the result of lavish gifts from an excessively profitable business. (Actually, the national rate of return on net assets in the petroleum industry has been about the same as for all manufacturing corporations over a long period of years). Rather, the change has come about because the state's petroleum output has flowed into the sinews of all major businesses within the state.

To see how oil and gas have been interwoven into the economic life of the Southwest, we will note (1) contributions to government and education through taxes, (2) the manner in which gasoline and kindred products have changed transportation within the Southwest, (3) the never-ending search for oil and its effect upon the region, and (4) a more personal glimpse of oil in your everyday life.

Imagine a bank that has existed continuously since the beginning of civilization. Suppose that $200 was deposited every hour, starting with the opening of the Christian era. The deposits continue, $200 an hour, 24 hours a day, 365 days a year, for 1958 years, with no interruption. The sum

N TEXAS



of money on deposit to this account would still fall slightly below the amount of taxes paid by the oil and gas industry to the state government of Texas since the turn of the century.

It is estimated that by the end of 1958 the industry had paid to the State of Texas alone about $3½ billion in the form of production taxes on oil and gas and gasoline taxes, not to mention taxes paid to local governments.

FOR these taxes, of course, the oil industry has received the benefits of government services, including the guarding of civil rights, such as are accorded all citizens. In turn, this golden stream has provided a channel by which the natural resources of the state have benefited all citizens of Texas in many ways.

A few years ago, R. B. Anderson, who was later to become U. S. Secretary of the Treasury, wrote in an article in *Texas Parade*.

> Whether the oil man's bit taps a sand capable of producing five barrels or 5,000 barrels a day, each citizen in the state shares in the successful ventures. He does this without sharing in the risk assumed by the oil man who works on the short end of a gamble which is pointed up by the fact that four out of five wells drilled in unproved territory are dry.

In a typical year, taxes from the oil and gas industry pay some 46 per cent of the state cost for public education, and 50 per cent of the cost of operating the state's eleemosynary and correctional institutions.

These figures do not include the amounts paid by the oil and gas industry to public schools at the local level. One survey of 500 school districts showed that 107 of these districts received more than one-half of their local revenue from oil and gas producers.

In communities near oil and gas fields, taxes from the industry have brought striking improvements in the schools. But even in communities far removed from oil fields, tax returns from petroleum exert an influence. Take, for example, the small town of Lewisville in Denton County. A statement from the Mid-Continent Oil and Gas Association points out that in a typical year local taxes provided about $26,000 for Lewisville schools. The school district likewise received $36,000 from per capita apportionment and $42,000 in Minimum Foundation funds, a total of $78,000 from the state. When the sources of these funds are examined, you find that approximately $36,000 of this state money came from oil and gas taxes. Thus the oil and gas industry provides more money for the schools of this district, even though there is no oil activity here, than is provided in total from local taxation.

In addition to taxes, payment of leases, bonuses, and royalties on public school lands has contributed large sums of money for education. In this manner the industry by the end of 1958 had paid into the Permanent School Fund more than $360,000,000. The University Permanent Fund had received more than $300,000,000. The University of Texas had about 4,000 producing oil and gas wells on its lands.

AT The University of Texas, a survey asked faculty members, "What do you regard as the University's most perplexing problem?" An overwhelming response turned out unexpectedly to be "parking."

Community planners in every large city in the state hover over the council table to discuss how to create more parking space in downtown areas.

Tractors and graders work steadily on an enlarged network of paved highways to accommodate a steadily enlarging automobile traffic pattern criss-crossing every corner of the vast state.

Such are but a few of the many symptoms of the almost total penetration of our day-by-day life with gasoline transportation. No discussion of the place of oil in everyday life would be complete without doffing our hats to this most obvious manifestation. Suburbia would be impossible without it.

Exactly 60 years ago, the first automobile bumped along the roads of Texas, driven by Col. E. H. R. Green of Terrell, who was then president of the Texas Midland Railroad. By mid-century Texans owned one motor vehicle for every two persons, and rapidly moved toward the status of two cars in every garage.

Since the establishment of the State Highway Department in 1917, more than two billion dollars has been spent in paving and maintaining state highways by the state government, exclusive of federal funds. Over the 56,000 miles of state-maintained highways in the state, traffic averages 104,000,000 vehicle miles every day, enough to carry 4,000 Texans around the world daily.

Texas refineries manufacture about 29 per cent of the nation's gasoline. This gasoline and kindred products flow out to power other forms of transportation as well as the passenger automobile. In a year trucks burn more than 182 million gallons of fuel on Texas highways. Approximately 82 per cent of the cultivated land in Texas is farmed by tractors using petroleum fuel. Petroleum products constitute 98.22 per cent of the fuel used by Texas railroads in a single year.

Petroleum and petroleum products make up a significant part of the commercial freight hauled in the state. In 1957, petroleum amounted to—

- Eight out of every ten tons of commerce handled in Texas harbors;
- Two out of every three tons of Texas intracoastal waterway traffic;
- One out of every eleven tons of rail freight.

TODAY, nearly threescore years after Captain Lucas' discovery well blew in at Spindletop, the ceaseless search for oil continues. In Texas alone during 1958 total expenditures for geophysical exploration averaged about $4,500,000 a month. There were 138

seismograph crews, 16 gravity meter crews, and two magnetometer crews at work in the state on an average day. And, in addition to these geophysical efforts, millions of dollars are invested annually in the work of geologists and other scientists devoted to the task of keeping America supplied with oil and gas.

The petroleum industry has nearly one-half of the area of the state under mineral lease. The area proved for production, however, is only about five million acres, or approximately 6 per cent of the leased land. The other acreage must be carefully scrutinized and probed in a search that has high risks and few jackpots.

In 1958, a new well was spudded in somewhere in Texas every 30 minutes. The total for the year was 18,000, of which more than one out of three were dry holes. (Among the 3,600 wildcat wells—those exploring in new territory—only one out of eight became a producer.)

If all of these wells could be placed end to end, they could go entirely through the earth about two times. And they were dug in a single year.

So far in this discussion of oil in modern Texas, we have emphasized statistics. But let's get personal for a moment, and look at the role oil and oil products play in your everyday life. At present chemists can derive some 500,000 compounds from petroleum, and these flow into everyone's way of life. If you follow the routine of most working men, you will begin the day somewhat as follows:

When the alarm goes off, you reluctantly roll out of bed and feel the fabric of your synthetic yarn carpet beneath your feet. In the bathroom, you press a plastic squeeze bottle to spread toothpaste evenly on the synthetic bristles of your brush. In getting dressed, you pull on a pair of socks, slip into a suit, adjust your necktie, all made from synthetic fibers, and part your hair with a plastic brush.

THE ink that made the print on the newspaper you read at the breakfast table contained an oil product, as did the detergent used by your wife to wash the dishes. The hard plastic top of the breakfast table, so easy for your wife to clean, was formulated from oil and gas. The lipstick your wife is wearing and the perfume you whiff as you kiss her goodbye both have an oil base. As you step across the lawn to the garage, you tread on the newly-spread fertilizer, a petrochemical product. Though you think nothing of it, an expert would point out that the T V antenna wires you observe atop your roof came from polyethylene.

Once in your automobile you become submerged in a world of oil and gas and petrochemicals. "I know," you would say, "grease that lubricates the car, oil that keeps the motor from burning up and gasoline that makes the motor run." But you should add to the list the synthetic rubber that went into the tires, the oil base for the car's paint, the petrochemical product which forms the plastic seat covers, the foam rubber in the cushion used to make your wife comfortable, the tetraethyl lead in the gasoline, and the antifreeze in your radiator. And likewise, the asphalt topping of the street in front of your home came from the oil refineries.

Everywhere you turn throughout the day, you encounter some form of oil or oil products. Fibers, plastics, and rubber comprise the better known end-products from oil and gas chemicals. From oil and gas, too, come numerous synthetic fibers of remarkable versatility. Texas has more than 70 petrochemical plants. Some 34 plants in the Houston-Beaumont area alone represent an estimated 50 per cent of the nation's organic petrochemical capacity.

Oil men throughout the nation are calling attention to their industry's centennial anniversary this year with this theme-line: "Oil's First Century—Born in Freedom, Working for Progress." Nowhere does that message have more significance than in Texas.

Turboprop planes like this American Airlines Electra taking off from Amon Carter Field introduced Humble to the commercial jet era. These jet-powered liners are the transition units between piston-powered planes and pure jets, which have no propellers.

FUELING THIRSTY JETS

New era in commercial air transportation brings rising demand for fuel, requires expansion of facilities

WITH a low pitched whine, the sleek turboprop airliner swept down the runway at Fort Worth's Amon Carter Field, lifted lightly into the air and banked eastward through the clear morning sky. After a stop at nearby Love Field in Dallas the plane then winged its way to New York, touching down at Idlewild Airport three hours and 55 minutes later.

Although flights like this are fairly common today (as more and more jet-powered planes hit America's commercial air routes), this particular American Airlines run on May 17 was observed with gala festivities at both Carter and Love fields. It marked American's inaugural jet-powered flight from the Southwest and added another chapter to Texas' expanding horizon in commercial aviation. Humble also found the occasion historically significant. For it was the first scheduled commercial passenger flight to be powered with Humble jet fuel—manufactured by employees at Baytown Refinery—and signaled the Company's official entry into the commercial jet fuel market.

In most of the larger cities today passengers already can board jet-powered turboprop planes and luxuriously cruise to their destinations at speeds up to 425 miles per hour. And on the longer, more heavily traveled routes like New York to Los Angeles you can ride a "pure jet"—no propellers—and zoom through the sky six miles up at better than 600 miles per hour. Within the next five years, airlines throughout the world will switch from piston powered planes in rapid succession. More than 900 jets, in fact, are scheduled to be delivered during this time, mostly in 1959 and 1960.

As more and more of these bigger and speedier planes find their way to the civilian airways, Humble and the petroleum industry stand ready to supply new services to the airlines and vast quantities of special kerosene-type turbo jet fuel.

The significance of this fuel business is easily understood when you consider the thirst of today's big jet planes. One turbojet model consumes kerosene at the rate of 700 gallons per hour while just idling on the ground. And in flight, consumption hits nearly 2,400 gallons per hour. These planes burn fuel at roughly five times the rate of today's big piston ships like the Super Constellation.

Although statistics like these insure increased long-range demands for fuel, immediate consumption in this initial phase of the jet age is relatively light. To supply fuel for the American Airlines' turboprop flights out of Fort Worth and Dallas, for example, Humble delivers only about 9,000 gallons per day. Manufactured at Baytown Refinery, this fuel first is pipelined to Irving Products Terminal about midway between Carter and Love Field. Carter Field subsequently is supplied from Irving by tank truck and Love Field through two new parallel five-mile products pipelines. These four-inch lines—one for jet fuel, the other for aviation gasolines—have a combined capacity of almost 420,000 gallons daily. The kerosene line insures adequate delivery of fuel as the jet age picks up pace later this year.

And the jets are coming fast. Sometime this summer, American will begin

As speedier turbojets inaugurate service from Texas this summer, Humble's sales of jet fuel will more than double. These planes burn fuel at about five times the rate of piston planes.

scheduling "pure jet" flights into Fort Worth and Dallas and consumption of Humble turbo fuel should more than double at that time. Also, later on this year, the Company will gradually start supplying fuel under contracts to various other airlines. In July, for example, Humble will begin fueling Delta Air Lines' jet flights from Dallas; and this fall, Braniff International Airways jet runs from San Antonio. American also will schedule jet flights from El Paso later this year, flights which will be powered with Humble fuel.

All told, Humble anticipates sales of 12 million gallons of commercial turbo fuel this year. By 1960, however, that volume is expected to expand to about 55 million gallons and to 65 million gallons by 1961.

Although the job of manufacturing such tremendous quantities of kerosene-type turbo fuel appears to be formidable and costly, the task is being met with comparative ease and modest expense at Baytown Refinery with only minor changes in run schedules. Key to this transition is Humble's experience and facilities developed and used in past years as well as today for the production of a variety of military jet fuels—a gasoline-kerosene mixture and two different kerosene types.

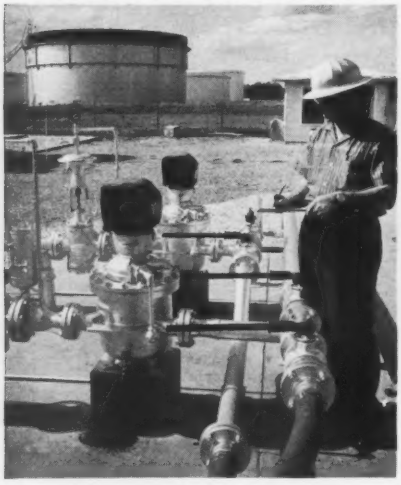
Where the Company invested many millions of dollars for new plants and equipment to turn out vast quantities of high octane aviation gasoline during World War II, jet fuel is being produced primarily with equipment that has been installed at the refinery during the last 10 years. These units have not only been employed to produce military jet fuels for the past decade, but also household kerosene, heating oils, diesel fuels, and other middle distillate products. About the only major refinery addition brought by the commercial jet age is a new modern Finishing Unit used to bring household kerosene up to the purity levels required for precision-built jet engines.

The military fuel system at the refinery now turning out Humble's kerosene-type jet fuel can triple output practically overnight as demand warrants. This system includes manufacturing facilities, storage tanks, and a small pipeline network.

As one refinery technician pointed out, "when the commercial jet age finally arrived, Humble was ready and waiting at the spigot."

While anticipating and meeting the immediate demands brought on by the fast-flying jets, Humble employees also are hard at work developing still newer products and services for their airline and general aviation customers.

One research project on which chemists are working currently involves a cleaner burning type of kerosene. Although kerosene smokes very little under normal flight conditions, wet takeoffs—whereby water is sprayed into the engines to provide added power—usually result in heavy clouds of black smoke. This is such a prob-



At Irving Terminal, operator meters flow of fuel through new Love Field pipeline.

Opening new Irving-Love Field line are P. D. Phillips, Jr., assistant general manager of Humble Pipe Line Company, and R. H. Venn, manager of Humble's Marketing Department.

lem that one airport has outlawed wet takeoffs, and the procedure has not been adopted for general use. Without this added source of power, some airliners can't leave fully loaded. In an effort to solve the problem, Humble scientists recently developed a very highly refined cut of kerosene in which certain smoke-producing elements were removed. This fuel is now being tested and appears to partially solve the wet takeoff dilemma. It is hoped also that engine operating changes can be made to improve this situation.

Humble also is conducting research, in cooperation with equipment manufacturers, to develop more efficient jet fuel dispensing and filtering systems. Filtration is particularly important with jet fuel, for the kerosene burned in turbine engines must be exceptionally clean and dry—clean of contaminants and dry of water. Even now, jet fuel is filtered at least six times from the time it leaves Baytown Refinery until it enters a jet plane's wing tanks.

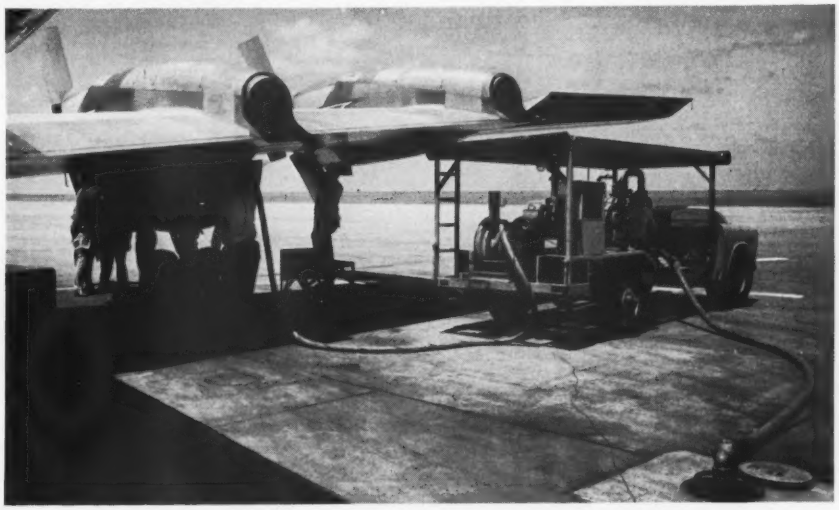
Anticipating startling aeronautical advances, Humble chemists are researching more powerful types of fuels. To power commercial airliners which will fly at three times the speed of sound—already on the drawing boards but a long way from the runways—Humble is seeking entirely new esoteric, high energy chemical and petroleum propellants. As one scientist explained, "we are zeroing in on the molecules, seeking out those with greater power potentials."

And work along this line has not been without success. One new fuel recently developed in a Humble lab yields about 25 per cent more power per volume than fuels now being used in jet planes. This additional thrust may double a jet's range, for "the business of getting the bird off the ground and in flight uses much of a plane's fuel load."

"We don't know when it will be, but somewhere down the road jet fuel will probably be as different from today's turbo fuel as the turbo fuel differs from today's aviation gasoline," one chemist pointed out.

Everywhere today on the commercial jet scene you find change, change which bespeaks intriguing prospects for tomorrow. Along with the airlines, Humble feels the excitement "of crossing a threshold, of playing a part in squeezing the world down to half its present size."

Super fueling trucks will speed the delivery of Humble jet fuel later on this year to airline customers at San Antonio and El Paso, where hydrant fueling systems are not available.



Hydrant systems speed the fueling of jet airliners at both Carter and Love Fields. From underground storage tanks, the fuel is pumped through hydrant cart, then into the planes.

Special under-the-wing fueling system facilitates the loading of turboprop plane. More than 5,000 gallons of kerosene can be pumped into the ship's tanks in less than 15 minutes.

Security for today and tomorrow is provided by

The Extra

If a Humble employee is disabled temporarily, his family will not be deprived of regular income.

THIS year, as it has for the past several years, Humble is spending approximately *36 cents* on employee benefits for every dollar it pays in direct wages for work performed. About 10 cents of the 36 cents is paid out for vacations, holidays, and other time-off periods with pay, and a little over 2 cents is paid out for various benefits provided for under federal and state laws for which the Company pays taxes. Most of the rest of the extra 36 cents goes to support a number of special programs designed to protect the employee and his family against financial catastrophes which might otherwise result if he should become temporarily or permanently unable to work prior to normal retirement.

The motivation behind this over-all program—which cost the Company $44,595,792 last year—is not altogether altruistic; Humble knows that an employee does his best work when he is healthy, happy, and free of nagging fears of financial insecurity. Therefore, insofar as it can do so without infringing upon the rights of individuals to manage their own affairs, Humble tries to make it possible for its employees to have that peace of mind.

The employee benefits program reflects Humble's long-established and often repeated philosophy that the greatest asset of any company is its employees. As Executive Vice President Carl E. Reistle, Jr., said recently to a group of supervisors, "What is good for our employees is good for Humble, and the reverse is equally true."

What are these extra benefits that, in effect, increase the average Humble employee's work-time earnings by more than one-third of his base pay? What is the net result of the over-all program as it applies to the individual employee?

To answer those questions, let's go back to that idea of peace of mind mentioned a few paragraphs earlier. Every Humble employee who takes full advantage of the opportunities available through the Company's employee benefits program can gain considerable peace of mind through the knowledge that:

1. His family will not be deprived of income in the event of his illness, injury, disability, or death.

2. He is regularly saving a portion of his current earnings in a growing fund that will serve as a buffer against future needs.

3. He will have an assured income in future years when age or disability prevents him from working for a living.

Now let's review the phases of the program that protect the employee in case of illness, injury, disability or death. Some of these features—notably the special accident, sickness, and death benefits—are paid for entirely by the Company; there are also other voluntary features in which the employee pays part of the cost and the Company pays the remainder.

The free Benefits Plan, which will be described more fully later, assures the employee a continuation of income while he is off the job because of illness or injury. This Plan also provides special benefits for (1) a victim of an industrial accident, (2) a long-service employee whose illness or injury prevents him from ever returning to his job, and (3) dependent relatives of an employee who dies.

In addition to those free benefits provided by the Company, the employee can gain further protection by voluntary participation in the group life insurance program and one of the two optional forms of hospitalization and medical expense insurance. His premium rates are low, because the Company pays a portion of the total cost and because he has the advantage of group rates which are much lower than those obtained for individual insurance contracts.

The amount of life insurance avail-

a 36 Cents

If a long-service employee suffers permanent total incapacitation, he may be retired with an income for life.

If death takes the breadwinner out of the picture, his family receives timely financial assistance.

able to the employee under the Group Life Insurance Program is governed by his current scale of pay and now equals about one and one-half times his annual earnings. As his pay increases, the allowable amount of insurance increases. The Company sponsors and administers the program and contributes $150,000 a year to supplement employees' premiums.

Under the Company's Hospitalization, Surgical, and Comprehensive Medical Expense Insurance Plan, the employee can take his choice of two types of coverage. One is known as the Basic Plan, and it is advantageous in cases where medical bills consist largely of hospital and surgical expenses. The other is the Comprehensive Plan, which covers a portion of almost all types of medical expenses, whether the patient is hospitalized or not. Some of the employees at the Baytown Refinery have a different form of coverage with Blue Cross-Blue Shield.

For fuller explanation, and a better look at these benefits and insurance plans, let's review some actual cases.

A Simple Illness

Early this year, a field employee of the Production Department spent eight days in a hospital and was off from work for more than three weeks because of illness. Without the provisions of the benefits program, his illness would have cost him $385 in lost salary and $193 in hospital bills, or a total of $578, plus doctor's fees.

Actually, he lost virtually none of his salary and paid only $63 of the hospital costs. Humble's sickness benefits payments were approximately equal to his regular pay, and the Basic Plan of hospitalization insurance in which he was a participant paid for most of his hospital expenses. (Of course, to be entirely accurate, the employee would have to figure his premium payments as part of the cost of his illness.)

The schedule of sickness benefits is based on length of service, starting with four weeks' full pay and two weeks' half pay for an employee with one year of service, and increasing to a maximum of 26 weeks at full pay and 26 weeks at half pay for a long-service employee. The same benefits apply for off-the-job injury as for sickness. An even more liberal program is in effect for any employee injured in an on-the-job accident or stricken with an occupational disease.

The Basic Plan of hospitalization insurance, which covered most of this employee's hospital costs, provides for reimbursement for hospital room and board up to $9 a day, plus 80 per cent of other covered charges in excess of $10, with a maximum of $4,000 for any one illness. If surgery had been involved, the policy would have paid a fixed allowance for surgical fees.

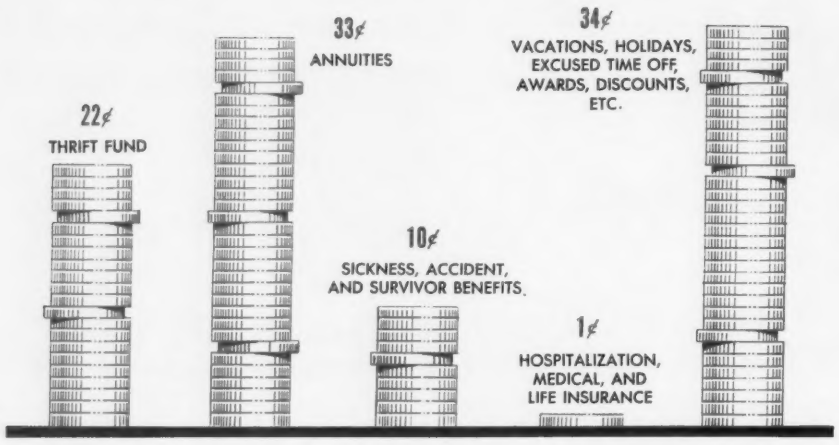
A Serious Illness

Although the Basic Plan gave the best coverage in the illness case outlined above, another employee was served to better advantage by the Comprehensive Medical Expense Plan.

He was a Humble gas plant employee who had to miss 13 weeks of work recently because of bronchial pneumonia with complications. His hospital stay was short but his medical bills totalled $610. Fortunately, he was a participant in the Comprehensive Plan, which covered all but $238 of the medical costs, while the Company's sickness benefits payments just about equalled his normal earnings for the full 13 weeks.

The Comprehensive Plan, introduced in 1957, is a form of major medical insurance with a deductible arrangement. The insured employee pays all of his medical expenses during a calendar year up to $115, $155, or $195, depending upon his annual salary. The insurance then pays 75 per cent of all covered charges in excess of that, up to a maximum of $10,000. This coverage

HERE'S HOW HUMBLE'S AVERAGE BENEFITS DOLLAR WAS SPENT IN 1958*



* This compilation does not include temporary early retirement or separation allowances in effect during part of the year, nor does it include Company contributions toward benefits provided under federal and state laws.

includes doctor's fees, prescription drugs, and hospital expenses.

Humble annuitants also may participate in a modified form of either of the hospitalization insurance plans, if they retired on or after May 1, 1954, and were insured in the employee plan at the time they retired.

Humble pays the first $2 of the monthly premiums of all employee and annuitant participants in either of the plans. The monthly cost to the participant is $1.15, if he covers himself alone; $4.95 for the participant and one dependent; $8.05 for the participant and two or more dependents. An additional charge of $3.15 is made for each insured dependent child who is 19 or over but is still less than 24 years of age.

Permanent Total Disability

But suppose an employee becomes totally disabled and is unable to return to his job after all of his sickness or accident benefits have run out? What can he expect from the Company's benefits program?

Let's take the case of an employee who, after 15 years with the Company, is stricken with a crippling disease that renders him totally and permanently disabled. In the first place, his Comprehensive Medical Expense Plan insurance covers the major portion of the costs of his illness. Under the Sickness Benefits program, he receives payments equivalent to 26 weeks at full pay and another 26 weeks at half pay, so that his income from that source for the first year amounts to about two-thirds of what he would have earned had he been working.

When the disabled employee is unable to return to work after 12 months, he may retire under the provisions of the Permanent and Total Disability Benefits Program with a monthly income, including social security, of more than 37½ per cent of his normal earnings. That income will continue as long as he lives.

If the employee is permanently and totally disabled before age 60, he can also receive income from his Group Life Insurance. One-half of the amount of insurance in effect when disability commences will be paid to him in monthly installments over a period of 50 months. At his death, the full amount of his insurance, less the sum of the monthly installments already paid, will be paid to his beneficiary.

In Case of Death

If any Humble employee with a year or more of service should die, his preference beneficiaries—widow, minor children, or dependent parents—start receiving monthly survivor benefits payments from the Company. These monthly payments are equal to one-half of the employee's normal pay, and continue for a definite number of months, depending on the employee's length of service. The minimum is six monthly payments for one year of service. At five years of service the payments continue for 24 months, and the schedule increases thereafter by one additional monthly payment for each year of service.

Under some conditions, survivor benefits on a modified schedule are also paid by the Company to qualified beneficiaries of retired employees.

In addition to the survivor benefits, a deceased employee's beneficiaries will, of course, receive money from his group life insurance, his thrift fund, and his annuity fund.

Although our discussion here is necessarily limited to the broad aspects of the various features of the employee benefits program, it is apparent from the above that the program is well planned to serve the employee's primary financial needs in the event of his disability from any cause.

(In succeeding issues of THE HUMBLE WAY *we will discuss the high points of the other phases of the program. Watch for an article on the Annuity and Thrift Plan in the next issue.)*

HERE'S WHAT HUMBLE SPENT ON EMPLOYEE BENEFITS IN 1958

Annuities	$13,844,119
Benefits (Sickness, Accident, Survivor, Permanent and Total Disability, Separation Allowances, Military Leave)	5,347,006
Group Insurance	510,034
Thrift	8,745,980
Awards	138,779
Discounts on Company Products	902,626
Vacations	8,261,918
Holidays	3,738,552
Other Time Off	555,854
Benefits Provided Under Federal and State Laws (Federal Social Security, State and Federal Unemployment Compensation, Workman's Compensation Program)	2,550,924
Total	$44,595,792

Strips of magnetic tape, capable of recording every shudder of the earth from a dynamite blast, are fast pushing the paper record into the background as a seismic recording medium. Geophysicists find that use of tape reduces reshooting, makes data more valuable.

OIL HUNTING WITH TAPE

Magnetic recording helps seismic explorers find subsurface structures that might form oil traps

MAGNETIC tape — the versatile ribbon of plastic used so widely in home recording and radio-television rebroadcasting—has joined the search for oil.

It is rapidly replacing sensitized paper as a medium for recording data gathered in seismograph probes of the earth's subsurface. Introduced as a seismic tool only about six years ago, magnetic recording is now employed by more than half of the crews in the world. The reason: One seismic shot recorded on tape can do the work of several shots recorded on paper—and do it better.

For more than 30 years, the seismograph has been one of the most widely used and successful geophysical exploration tools known to the oil industry. In principle, the method is fairly simple (see box on page 31). But in actual field operations the operators are constantly beset with problems.

One major handicap has been the limited range of sound waves the paper record could handle. That limitation made it necessary for seismic crews to predict in advance which reflections from below they wanted to pick up, and to set their amplifiers to emphasize these desired reflections. In other words, they had to aim the instruments for a predetermined depth.

To compound that difficulty, crews using paper records also had to contend with noise—the bothersome, unusable sound waves that crept into their records to confuse the picture. There was no defense against such noise. The only answer was to compromise with it, to attempt to choose the amplifier setting that would give a maximum amount of useful signal and a minimum of noise.

Sometimes, of course, the operator's educated guess would go awry. When that happened, the result was a confused record that yielded no accurate information. Usually, this meant that

Operator rolls a strip of magnetic tape onto recording drum inside the seismograph truck as exploration crew prepares to fire explosive charge. Loading takes only a few seconds.

At the playback center, technician plays the tape record, tries various filters to obtain the seismic signal he seeks. He can watch the visual signal on oscilloscope in background.

another expensive, time-consuming shot had to be undertaken.

Even if the crew did get a good series of shot records, the subsurface picture was limited to the predetermined levels. Often, seismic crews had to go back later to repeat the entire costly shooting process to get information on rock strata at other depths.

Seismic explorers lived with these recording limitations for many years until somebody got the idea that magnetic tape recording and playback equipment might be adapted to seismic work. One company tried it; then another and another, and geophysicists were pleased to find that it solved some of their most vexing problems.

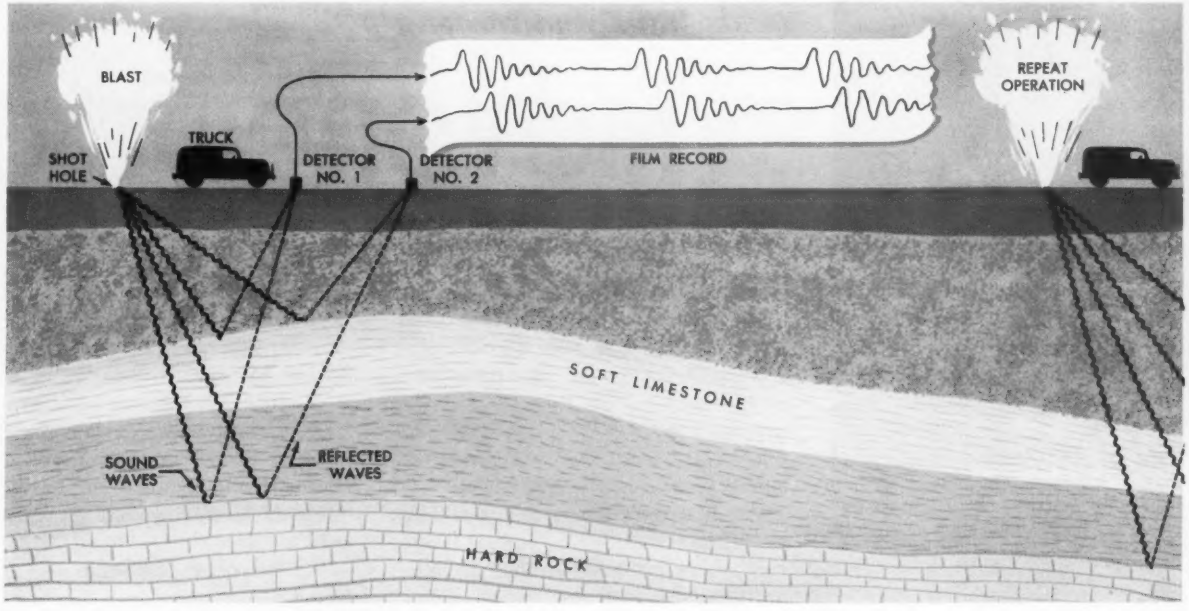
Because it can record a wide band of sound wave frequencies, magnetic tape takes the guesswork out of amplifier settings. The operator no longer needs to decide in advance which depth level to aim for. He can explode a to-whom-it-may-concern charge, one large enough to reach many thousands of feet into the earth and send back reflections from rock strata at all depths. The tape faithfully records all the impulses.

Later, at a playback center, the tape record can be played over and over while a technician tries many different filters until he finds the one or the combination that emphasizes the signal from the desired depth. Unwanted reflections and noise interference are filtered out.

After serving its initial purpose, the tape record is put on file, readily available for later use. Information about other strata in the same location can always be extracted from the tape by using different filters.

But the use of magnetic recording does not mean that seismic crews will never have to reshoot an area. Sometimes, in preliminary mapping it becomes apparent that more shot points are needed to give more detail about an area. In such cases, the crew must return to the field and shoot them. Also, when more effective shooting techniques are developed, certain areas may be reshot using the new methods.

One of the fringe benefits of tape recording of seismic data is the ease with which the information can be reproduced. Several companies, Humble among them, have developed their own techniques for making paper rec-



HOW THE SEISMOGRAPH HELPS FIND OIL

Seismic exploration combines the seismograph, a delicate instrument originally devised to record earthquakes, with a principle of physics that says sound travels at different speeds through hard and soft substances—in this case rock formations lying below the earth's surface.

Seismograph crews create small earthquakes by setting off an explosive charge in a shallow hole, sending sound waves slicing into the earth. Those waves rebound from underlying rock strata in a split second and are picked up by a group of sensitive detectors dispersed in patterns on the ground.

Relayed by cable to a seismograph in a nearby truck, the reflections are recorded either on a strip of photographic paper or magnetic tape. Soft formations reflect weakly; hard formations make stronger impressions. The depths of the various reflecting layers can be determined by measuring the time required for the sound waves to rebound from them and reach the surface.

In surveying an area, seismic crews explode dozens of charges at uniformly spaced shot points. A trained computer at the exploration office interprets the series of records and combines them to form a cross section of the area tested.

Later the cross sections are developed into a contour map showing rises, dips, and breaks in the subsurface. To the trained eye of a geologist or geophysicist, such a map will reveal any likely formation structures where oil or gas *might* have accumulated. Only by drilling a well, however, can you find out whether there *is* any oil or gas.

ords transcribed from tape. These paper records are better than the conventional type made at the scene of the shot, because certain corrections can be made in transferring the data from tape to paper.

In reduced size, these paper records can be pieced together to form a visual picture covering miles of subsurface strata. Such presentations are useful, one Humble geophysicist explained, because "they help us to see the forest instead of the trees."

The only deterrent to use of magnetic tape recording as a seismic tool is its cost. But oilmen feel that the increased usefulness of the data recorded magnetically offsets the greater expense. In fact, they foresee a bright future for tape in oil exploration.

One reason for this is that magnetic recording works well with the newly developed "thumper" method of seismic probing, in which no dynamite shot is used but a heavy weight is dropped on the ground to produce vibrations.

Tape could also reverse the present trend toward the use of more and more complex instruments in field work. Oil hunters of the future may take simpler instruments with them to the field, leaving the more complicated devices at the playback centers that are springing up throughout the oil country.

And those are not all of the prospects geophysicists see for tape. They are now asking themselves: "Since information recorded on tape can easily be fed into electronic data processing equipment, why not turn the routine seismic correction work over to such machines?" This would free men from routine chores and enable them to devote their time to work that requires the exercising of judgment—jobs such as picking and correlating reflections and converting seismic data into maps. Several oil companies, including Humble, are experimenting with the use of data processing machines for correction work.

If the petroleum industry is to continue to meet the growing demand for its products, its explorers must find new reservoirs of crude oil with increasing frequency. Aided by new exploration tools like magnetic tape, oil hunters expect to meet the challenge.

Colonel Homer Garrison, Jr. is gravely concerned about the ever-increasing toll of life, limb, and property on highways of Texas.

A noted safety authority speaks frankly on how to stop

MOTORCIDE ON

THE death and accident toll on the nation's highways has long since reached catastrophic proportions. Last year alone, 36,700 persons were killed, almost three million injured, and property damage hit an all-time high of $6.5 billion. Altogether, more Americans have died in traffic accidents than in all our wars.

How can this shameful loss of life, limb, and property be curbed? What is Texas doing about highway safety? For the answers to these questions, we called on Colonel Homer Garrison, Jr., director of the Texas Department of Public Safety and one of the most respected voices on this disturbing national problem. Here's the way the interview went.

Question: Colonel Garrison, how does the Texas traffic toll compare with the national figures?

Answer: I'm afraid we can't cast any stones. Last year Texas averaged an accident every 83 seconds, an injury every four minutes, and six deaths every day. In all, there were 2,342 persons killed, 127,000 injured, and an economic loss amounting to $347 million.

Q: But isn't that an improvement over the previous year?

A: In fatalities, yes—an 8 per cent reduction. The death rate of 5.3 . . .

Q: . . . That's the number of persons killed for each 100 million vehicle miles?

A: Right. The '58 death rate—5.3 —was the lowest on the Texas record books, the number of deaths was the lowest of any year since 1949. Travel increased 3 per cent but 197 fewer people died on our highways. We're proud of that.

Q: How about the Texas traffic accident picture this year?

A: It doesn't look good at all. Fatalities are hovering at about 10 per cent above last year—about the same as 1957.

Q: Back to 1958. What were the reasons for the improvement?

A: You can't say any single thing saved those 197 lives; it was a combination of factors. The courts, driver education, strict enforcement, motor vehicle inspection, engineering of roads, public information and support. They're all extremely vital.

Q: What about the President's "Action Program" for traffic safety and the Governor's Highway Safety Commission? Did these campaigns have any measurable effect?

A: They certainly did; it'd be hard to overestimate their value. I don't look on these as "campaigns," though. In fact, I don't like the word; it suggests something that's here today, gone tomorrow. Traffic safety is a ceaseless crusade. You can't relax the fight against highway death for an instant.

Q: *While there were fewer deaths on Texas highways in 1958, I understand there were more accidents. What were the major causes?*

A: Nothing new, actually. The four big causes of rural accidents are: driving too fast for conditions, driving while drinking, disregard of a warning or stop sign, and being on the wrong side of the road.

Q: *By rural, you mean . . .*

A: . . . anything outside city limits of towns over 2,500. The term is a bit confusing.

Q: *How did the fatal accidents occur, mostly?*

A: That's an interesting thing. In many cases, the other driver—the guy that usually gets the blame — wasn't even involved. Nearly half were one-car crashes — people running off the road, colliding with telephone poles and such. This seems to indicate that if you yourself drive carefully, the chances are good you won't get hurt on the highway.

Q: *What effect, if any, will our new super highways have on the highway traffic problem?*

A: Well, there are two sides to that question. Take the new turnpike between Fort Worth and Dallas. It has a fine record so far, with a death rate far below the statewide average. On the other hand, the big new highways inspire a false sense of security, in my opinion. Also, they pose some special kinds of driving hazards; I'm sure you've heard of such things as highway hypnosis and frozen vision. I guess I would have to say that the new roads will have a good effect on our traffic experience—provided traffic laws are properly enforced. Where the highway is divided and without many cross-overs, it'll mean we need enforce-

"Last year, on the average, Texas had an accident every 83 seconds, an injury every four minutes, six deaths daily."

N TEXAS HIGHWAYS

ment for traffic in both directions.

Q: *Has highway traffic become such a problem, as some say, that the federal government should step in with a national highway police to enforce a uniform vehicle code?*

A: The Uniform Vehicle Code is basically a good thing, and the states are coming around to it. But traffic regulation, in my opinion, is strictly a state and local responsibility.

Q: *Speaking of enforcement, how does Texas measure up?*

A: The National Safety Council says we sit right up at the top, considering our manpower. But of the big traffic states, Texas has by far the lowest number of highway patrolmen. Right now we have 670 patrolmen. California, by comparison, has almost 2,400.

Texas has four million licensed drivers and just as many cars. Our patrolmen are hard-pressed to watch them all.

Q: *Weren't you given more highway patrolmen recently?*

A: Yes, some. In 1957 the Legislature authorized the hiring of 100 more men, raising our maximum strength to 770. Salaries were increased too, but they are still so low that we haven't been able to attract the full quota.

Q: *How many patrolmen do you really need?*

A: We've looked at the thing with every known formula devised, and the best of these indicate that we need a minimum of 1,600 men.

Q: *Have radar enforced speed limits helped alleviate the traffic problem?*

A: Well, radar has helped — somewhat. It isn't very popular with some motorists, of course. Some people think radar traffic control isn't playing fair. But this matter of driving on Texas highways is no game. The courts have held the automobile to be a lethal weapon.

Q: *Is mechanical failure of cars causing many accidents?*

A: Less last year than ever before— about 5 per cent. It used to be way up there, but motor vehicle inspection has taken a lot of danger off the road. No, I wouldn't say automobiles are causing many accidents. It's people.

Q: *Looking into the future 10 years, what are some of the safety techniques we'll be using to save lives with super cars and super roads?*

A: The automobile people, of course, are spending a lot on research. They tell me that within a decade or so, passengers will be packaged like eggs to withstand collisions at 50 miles per hour. They've already experimented with cars that can be set on automatic pilot for long trips. What we really need more than anything, though, is to raise just *one* safety-minded generation.

Q: *That leads me to this question: Who are the really bad drivers in our state — teenagers, women, elderly people?*

A: You can't place them in any particular category. I will say the most dangerous driver is the smart aleck. He knows the law but willfully violates it. He's difficult to apprehend because he always has an eye on the rear view mirror.

Highway slaughter will never be stopped until reckless driving becomes a moral issue — like stealing and murder. There's definitely something wrong when a man can and will brag to decent people that he averaged 90 miles per hour between this city and that city.

Q: *Is Texas tough enough on habitual violators?*

A: I would say we are tough but fair. When a driver gets his third ticket in a period of two years, he is sent a warning letter. On the fourth, he is called in for an interview and another driving test. On the fifth, his license may be suspended, but each case is judged on its own merits. In this state, driving a car is a privilege, not a right. More than 29,000 Texans lost that privilege last year.

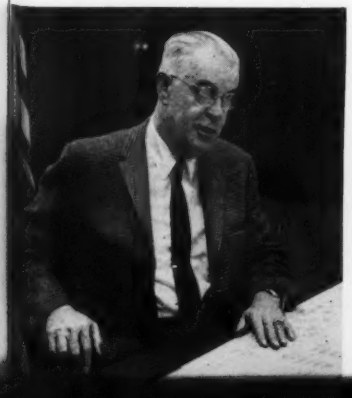
Q: *What constitutes a good driver?*

A: The obvious thing — and often overlooked, I think — is to be courteous and obey the law in spirit as well as letter. The Golden Rule should apply to the road.

Also, the good driver is always on defensive: he's alert to what the other fellow is doing. The thing that the average driver has to fight more than anything else, I suppose, is a kind of numbed unawareness. Some people, when driving to work, for example, can scarcely remember a thing along the way. That's bad because driving a car isn't an automatic thing like breathing. You have to work at it. Thirty-mile-an-hour thinking and 60-mile driving often means tragedy.

Q: *In the final analysis, then, the remedy to the highway traffic problem lies with . . .*

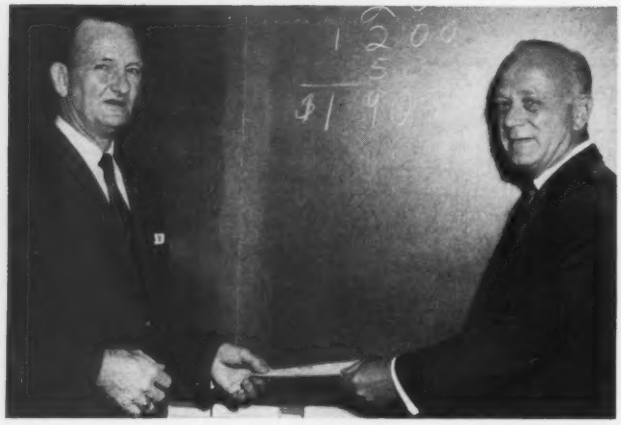
A: . . . the man behind the wheel and his attitude. All the agencies, all the crusades, all the slogans are worthless without public support. Safe driving is purely a do-it-yourself proposition.



"Highway slaughter will never be stopped until reckless driving becomes a moral issue—like stealing and murder."

"The remedy lies with . . . the man behind the wheel and his attitude. Safe driving is a do-it-yourself proposition."

Three CYI Capital Awards Presented



Jessie G. Taylor Vice President H. W. Ferguson

John A. Williams, Jr. Executive Vice President C. E. Reistle, Jr.

Three capital awards for employee suggestions submitted through the Coin-Your-Ideas program were presented during the first quarter of 1959.

Jessie G. Taylor, operator at the Paraxylene unit at Baytown Refinery, became the eleventh "grand slam" award winner in the history of the CYI program when he received a $500 capital award check in April. A grand slam winner is one who receives the maximum initial, supplemental, and capital awards for one idea. Mr. Taylor was awarded a total of $1,900 for his suggestion that de-icing outlet lines be installed on exchangers at the Paraxylene unit.

John A. Williams, Jr., of the Controller's Department in Houston also won a $500 capital award. Added to the initial and supplemental awards already received, this brought to $950 his total income from a suggestion, concerning an accounting revision affecting Humble's Louisiana franchise tax.

Director J. H. Galloway R. H. Moon R. F. Nokes R. C. Goode

Three Roberts — Robert F. Nokes, Robert H. Moon, and Robert C. Goode — all employed in the Stratton Production District, received $100 each as their share of a capital award for a suggestion they submitted jointly. Mr. Nokes is a truck driver; Mr. Moon is a roustabout gang pusher; and Mr. Goode is a roustabout. For suggesting that a combination pipe jack and lazyboard be used for laying small diameter pipe lines, each received a total of $185 in awards.

In addition to the $1,300 paid in the three capital awards, the Coin-Your-Ideas Committee awarded eight supplemental payments totalling $890, and 204 initial awards totalling $11,300 during the first quarter.

Humble To Market In Arizona

Humble announced in May that it was in the process of closing negotiations for the purchase of the Arizona marketing properties of the Sahuaro Petroleum Products Company of Phoenix.

C. E. Reistle, Jr., Humble's executive vice president, said that the negotiations with Doyle D. Willis, president of Sahuaro, will probably be completed early in July, and at that time, Humble will begin marketing its products in service stations in Phoenix and the surrounding Maricopa County area.

Completion of the negotiations will mark the entry of Humble as a marketer into a third state. At present, Humble products are sold only in Texas and New Mexico.

Walter Caughran, who has been serving as manager of the Company's El Paso district, will be the manager of Humble's new Arizona marketing district.

Employee Groups Win Safety Awards

Safety awards from both the National Safety Council and the American Petroleum Institute were presented to Humble employee groups recently.

Employees in Humble's producing operations received a first place award in the National Safety Council's 1958 competition. Their accident frequency rate was 2.09 disabling injuries per million manhours worked, compared with a national average of 4.98 for groups engaged in similar work.

American Petroleum Institute safety awards were won by the Marketing Department, Webster Pipe Line Station, Fort Worth and Beaumont Marketing Districts, and the Pledger Production District.

The Marketing Department and Webster Pipe Line Station groups each worked a million manhours without a disabling injury.

Marketing Reorganization Announced

A major reorganization of Humble's marketing operations will be effected on or about July 1. The move, which will involve the realigning of division and district boundaries and the expansion of marketing operations into Arizona, will promote maximum efficiency while continuing Humble's carefully studied program of decentralization.

The following changes are to be made: the Southeast Division, with headquarters in Houston and headed by Division Manager P. E. Nicol, will be divided into two districts, the Houston District and the Huntsville District.

The Northeast Division, headed by G. W. Wilmoth and headquartered in Dallas, will be comprised of East Texas District (at Tyler), Dallas District, and Abilene District.

The Western Division office, with R. T. Holmes as manager, will be moved from Abilene to Albuquerque. That division will be comprised of three districts; the West Texas District, with headquarters in Midland; the New Mexico District, with headquarters in Albuquerque; and the Arizona District, with headquarters in Phoenix.

The Southwest Division, managed by J. W. Austin and headquartered in San Antonio, will also have three districts. They will be the Corpus Christi District, which will include a large portion of the present Valley District; the San Antonio District, which will also include a part of the Valley District; and the Austin District, which will include eight counties from the former Abilene District.

High-Level Changes In Two Departments

New assignments in the management ranks of the Production and Manufacturing Departments have been made as a result of recent retirements.

R. K. Tracy, former production manager of the Gulf Coast Division, was appointed assistant manager of the Production Department on June 1. He succeeds R. E. Bridges, who retired on that date.

John S. Bell, manager of Humble's California Area operations, replaced Mr. Tracy as production manager of the Gulf Coast Division. Richard E. Faggioli, California Area geologist, became acting manager, California Area.

At Baytown Refinery, the responsibilities of Assistant Plant Manager James Harrop, who also retired June 1, have been assumed by Plant Manager G. L. Farned and Assistant Plant Manager H. H. Meier. The new post of administrative manager has been created to provide supervision over the Coordination, Accounting, Plant Protection, Employee Relations, and Medical divisions formerly managed by Mr. Harrop. I. D. Hall, former chemical coordinator in the Houston Office, has been named to this position. In addition, J. R. Barsalou was placed in the new position of Operations Manager, responsible for the Process, Operations Services, and Mechanical and Construction Divisions which previously reported to Mr. Meier.

Forty Years With Humble

The following Humble employees completed 40 years of service with the Company on the anniversary dates shown: Claiborne S. Roger (May 6), senior assistant buyer in the Purchasing Department, Houston Office; Carroll F. Wooley (June 20), farm boss at Pampa; James W. Carroll (June 30), coordinator at Baytown Refinery.

Recent Retirements

HUMBLE PIPE LINE COMPANY

Name	Location	Date of Retirement	Years of Service
George C. Allen	Tomball	June 1	34
Bernard T. Carson	Imogene District	May 18	31
Frank O. Perry	Pierce Junction	June 1	39
Roland R. Roberts	Southern Division	May 18	33
PRODUCTION DEPARTMENT			
Flavy Ball	London	May 2	32
Thomas E. Gregory	Ganado	April 16	29
Everett E. Magill	Gulf Coast Division	June 1	38
Marion L. Suttle	Tomball Natural Gas	May 23	24
EXPLORATION DEPARTMENT			
Estelle E. Reiss	Southwest Texas	March 19	25
BAYTOWN REFINERY			
Albert Bryan	Pipe Department	April 1	15
Olin A. Carroll	Docks Department	May 1	33
Frank L. Crawford	Solvents Department	June 1	17
William M. Garrett	M & C Division	April 27	21
James Harrop	Assistant Plant Manager	June 1	36
Marshall C. Rowell	Labor Department	May 25	25
HOUSTON OFFICE			
Cecille F. Chapman	Production and Exploration Accounting	May 24	28
Paul L. DeVerter	Manufacturing Operating	June 11	37
Jewel C. Smith	Civil Engineering	May 6	25
Richard L. Smoot	Marketing Accounting	June 3	37
Henry Williams	Houston Fuel Oil Terminal	May 14	27

Deaths

Employees: Fred T. Ball, 62, lease pumper-gauger at Greta, on March 30; Jim A. Bishop, 59, lease pumper-gauger at London District, on April 28; Carl R. Bush, 56, operator second at Baytown Refinery, on March 23; Eugene B. Dibrell, 64, utility man in the Houston Garage, on April 26; George E. Pasur, 50, stock gauger at Harbor Island, on May 14.

Elmer N. Raborn, 55, division clerk at Mexia District, on May 15; William H. Shields, 63, lease pumper-gauger at Avoca District in the North Texas Division, on March 22.

Annuitants: Rufus B. Bergeron, 61, former brickmason first at Baytown Refinery, on April 27; Elton F. Bird, 64, former helper at Baytown Refinery, on April 30; Henry D. Broyles, 69, former witness gauger at Gladewater, on May 14; Wade H. Callam, Sr., 78, former locomotive engineer at Baytown Refinery, on May 11; Alfred L. Capps, 58, former supervisor in Maintenance & Construction at Baytown Refinery, on May 12; Thomas J. Lamb, 77, former pumper at Holliday District in North Texas Division, on April 24.

Samuel E. Gleghorn, 74, former lease pumper-gauger, at Conroe, on May 4; Millard Griffin, 67, former pipe fitter supervisor at Baytown Refinery, on May 2; John Holder, 68, former engineer at Pittsburg Station in East Texas Division, on April 1; Noah W. Saxton, 67, former boilermaker first at Baytown Refinery, on April 12; Ross Steele, 80, former district chief clerk in Marketing at Jacksonville, on April 24; James E. Tomberlin, 68, former oiler at Yates-Pecos Station, on May 13.

Richard M. Upchurch, 68, former lease pumper-gauger at Tomball, on May 10; Grover C. Weisinger, 71, former blender at Baytown Refinery, on April 11.

By the way

• When he was 19, Homer Garrison, Jr. (Pages 32-33) made a big decision. He gave up his job as Angelina County surveyor to become a deputy sheriff because "the lure of the badge was greater than that of the transit." At the time, his father questioned his future in law enforcement, predicted he would wind up as a night watchman in his hometown of Lufkin.

Today, Colonel Garrison heads up the Texas Department of Public Safety, the multi-armed agency responsible for the protection of almost nine million Texans. Rising through the ranks of the Texas Highway Patrol, he has held the post since 1938.

Strictly out of curiosity, we asked the Colonel another question in addition to the ones on pages 32-33: "Have *you* ever had an auto accident?" It might have been considered impertinent, but Homer Garrison, Jr. answered it in his usual straightforward manner.

"Nothing major," he said, "but one night on the highway between Dallas and Austin I hit a mule. I wasn't hurt. The mule was in good shape, too, when I left him."

• While gathering pictures and information for the story on thirsty jets (pages 23-25), photographer Tom Nowlin and writer Joe Tucker noticed several strange-looking red and white cans sitting on the ramps at Fort Worth's Amon Carter Field. On the sides of each container were the enigmatic letters "FOD" and beneath was this terse message: "Nothing goes through a jet engine safely but air."

Upon investigating, Nowlin and Tucker found that the letters stand for "Foreign Objects Disposal" and that the cans are part of an expanding program to keep trash off the runways where more and more jet-powered planes will be landing and taking off in the months ahead. And the campaign is not without merit, for jets suck great quantities of air into their big turbine engines and don't take kindly to such things as bolts, wire, chips of wood, or rocks. Complementing this "FOD" movement at airports around the nation are highly publicized "bend over campaigns"—bend over and pick up the trash, that is.

This war on foreign objects also is being waged in still another and equally obvious manner—with vacuum cleaners. Equipped with brushes and magnetic pickups, these big industrial machines roam the runways sucking up trash with the same efficiency as their smaller household counterparts.

• The liquid-filled rubber ball pictured below is used to separate different grades of fuel being moved through Humble Pipe Line Company's new aviation gasoline line between Irving Products Terminal and Love Field. The ball is put into the pipeline at Irving between batches of 100 and 115-octane grades of gasoline and moves toward the airport

The ball goes between batches.

at about 20 miles per hour. When the ball arrives at Love Field, it trips a mechanical flag (pig-sig) which indicates to the operator that a new grade of gasoline has arrived. The operator then changes meter tickets and switches the new product into the correct storage tank.

In addition to indicating exact position of the two grades of gasoline, the "batching ball" also reduces intermingling of the fuels. This is particularly important in case the line has to be shut down with both grades of gasoline still in the line.

The Humble Way

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MAY-JUNE
1959

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Published every other month for employees and shareholders

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P. O. Box 2180, Houston 1, Texas

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BULK RATE
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For more than half of oil's first century, Texas has played an important role in the progress of the industry.

Beginning with the dramatic Spindletop field, recreated here by artist Bob Wygant from a collection of old photographs, Texas oilmen started learning lessons which were to make far reaching contributions to oil's progress.

Instead of a forest of derricks, today's Texas oil field is characterized by orderly well spacing and development. The industry also has developed scientific methods for conserving underground energy to produce more oil from reservoirs. Through these progressive methods hundreds of millions of barrels of oil have been added to the nation's reserves.